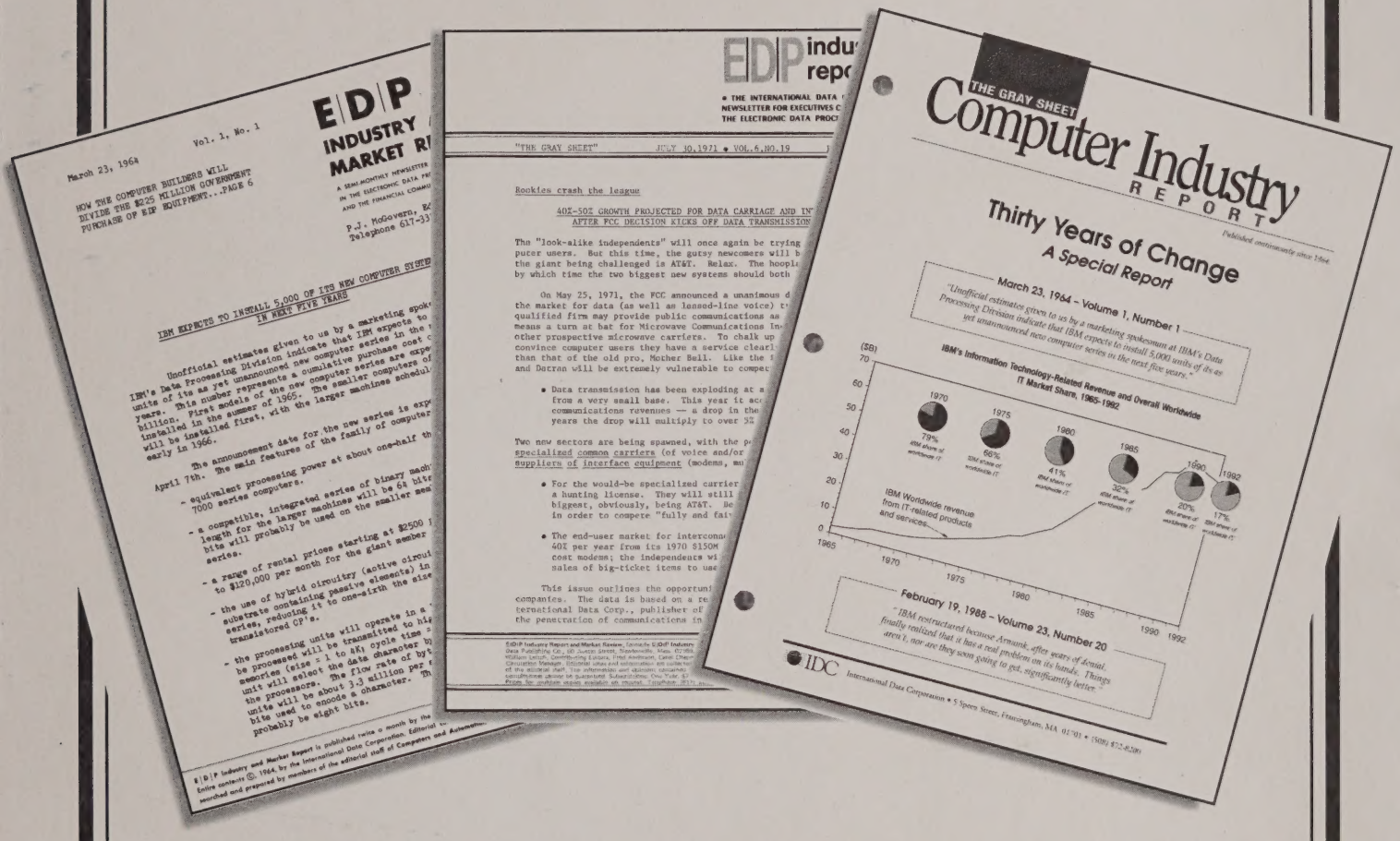
The Millennium Edition — The IT Industry 1964 – 1999



As Seen by The Gray Sheet

The Millennium Edition — The IT Industry 1964 – 1999

As Seen by The Gray Sheet

Molly Upton

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The Gray Sheet Salutes All Those

Who Have Built

The Information Technology Industry

Table of Contents

Page

Executive Summary ..... i- ii
Overview O1-O8
Estimates of IBM 360 Shipments 1
Timesharing 2
FCC Computer Inquiry 1 3-7
Packaged Software 8-16
Are Banks Allowed to Offer Computer Services? 17-19
Carterfone Decision 20-21
First Software Patent 22-24
Justice Files Antitrust Suit vs. IBM 25-31
IBM Unbundles 32-38
Computer Inquiry 1 – DP Is Unregulated 39-45
FCC OKs Independent Specialized Carriers 46-53
Computer Inquiry 2 Deregulates Terminal Equipment 54
Cable, Satellites, Infotainment on Horizon 55-59
'80s Trends; Software Should Dominate 60-63
PCs To Surpass Mainframes in 1984 64-68
Changes in Information Distribution 69-70
The Information Highway – Surf or Get Pummeled 71-78
Appendix: The Gray Sheet Reflects Along the Way
The '70s – Decade of the DP Shop (and a look ahead) A1-13
Changing Landscape After Twenty Years A14-18
A Pictorial Perspective After Thirty Years A19-38
Thirty Years of Change, Part II A39-40

List of Tables

Page

Software Packages Offered for Sale in Recent Months (1967) 10

Estimated Allocation of Costs to Customers (1969) 35

Data Processing vs. Data Communications (1971) 47

IDC's Long Range Technology Forecast via "Delphi" Survey Technique (1976) A13

Top Ten U.S. Independent Component Makers by Era (1984) A15

Leading U.S. computer Companies 1952-1983 by Era (1984) A15

A History of Computer Technology, 1955-1983 (1984) A16

List of Figures

Page

Recent Increases in Announcement of Software-for-Sale Products (1967) 8

U.S. TV Homes 1980-1990 (1980) 56

Two-Way Cable Subscriber Growth 1980-1990 (1980) 56

Personal Computers Rise to the Top; Value of U.S. Shipments 1978-1987 (1983) 65

Application Segmentation, U.S. Personal Computer Market (1983) 66

1982 Worldwide Revenues Top Independent PC Software Suppliers ($M) (1983) 67

Retail Dollar value of 1982 U.S. Shipments – Top PC Vendors (1983) 67

Changes in Creating, Distributing and Displaying Information: Four Views (1993) 69-70

Stages of Industry Growth (1995) 73

Market Drivers: Supply-Side Opportunities in the Value Chain (1995) 74

Migration to New Infrastructure Model, Traditional View (1995) 75

Cost Sharing of Network Assets (1995) 76

Intercorporate Internet – Applications in Use Currently (1995) 76

Price vs. Performance Comparisons IBM Processors (1979) A5

IBM's Slice of the Worldwide Installed Base (1979) A7

Increasing Chip Density (1979) A10

IBM's Memory Prices Over Time (1979) A11

Litigious Decade – Antitrust Suits vs. IBM (1979) A11

Maximum Worldwide Installed Base of IBM General Purpose Families (1984) A16

Average Compound Growth Rate Major Vendors 1973-1983 (1984) A16

U.S. MIS User Spending, 1963, 1973, 1983 (1984) A17

Measures of U.S. Computer Training (1984) A17

Storage Capacity (MB) Growth, 1975-1993 (1993) A20

Transistor Chip Density in Intel Microprocessors, 1972-1993 (1993) A21

MIPS Growth in Intel Processors, 1974-1993 (1993) A22

DRAM Chip Capacity 1971-1996 (1993) A23

List of Figures — Continued

Page

Relative Performance Growth of Four Key Technologies (1993) A24

U.S. Market for Multiuser and Single-User Systems, 1964-1996 (1993) A25

PCs in Use Worldwide by Processor Type, 1981-1993 (1993) A26

Worldwide PC Unit Shipments by Intel and Compatible Processor Type, 1981-1993 (1993) A27

The Invasion of 32-Bit Machines (1993) A28

Worldwide PC Network Interface Card Market Shipments 1995-1993 (1993) A28

Worldwide Modem Shipments by Speed, 1980-1992 (1993) A29

Worldwide Installed Base of Network Nodes 1991-1995 (1993) A29

Storage Explosion: Worldwide Captive and Noncaptive MB Shipped 1987-1996 (1993) A30

Dramatic Price Declines: Average Prices of Selected Hard Disk Drives 1987-1996 ..... A30

IBM's Information Technology-Related Revenue and Overall Worldwide IT Market Share 1965-1992 (1993) A31

Worldwide IT Market by Region, 1991 and 1996 (1993) A32

Worldwide IT Market by Hardware/Software Categories, 1996 and 1996 (1993) A32

Beyond Sequential Processing: Parallel Machines May Provide Next Big Performance Jump A33

The Plunging Price of Mainframe MIPS (1993) A33

Employment in Software- and Hardware-Oriented Occupations In User Organizations 1972-1988 (1993) A34

Population and Communication Technology Penetration: A Wide Gap Narrowing Slowly 1980 and 1990 ..... A34

Worldwide Multiuser Systems Installations 1987-1997 (1993) A35

Worldwide Multiuser Systems, Value of Installations 1987-1997 (1993) A35

Real and Nominal Growth of the U.S. Hardware Market 1972-1992 (1993) A36

U.S. IT Market by Major Category 1969-1992 (1993) A37

Penetration of Major Electronic Media in the U.S. 1984-1992 (1993) A38

Abstract

The Millennium Edition — The IT Industry 1964–1999

As Seen by The Gray Sheet

We shined a bright light in all the musty corners of the IT industry and have selected many of the seminal events in the industry's development since 1964 for inclusion in this armchair history. This volume provides readers with a "you were there" view and a realistic perspective of the industry's evolution since 1964.

The volume reproduces, to the best of our ability, 17 issues covering important events and trends as well as several issues that illustrate *The Gray Sheet*'s analysis of trends, both past and future. It is available only in hard copy.

There was a time, not so long ago, when industry sectors were being created at a feverish pace. *The Millennium Edition – The IT Industry* reveals the creation of the following industry segments:

- Independent software industry
- Data communications equipment industry
- Competitive data transmission options

While compiling this volume, it became clear that the IT industry's history is rarely assembled in one place, and almost never with a contemporary reportorial lens that also consistently provided analysis and perspective.

The lessons that can be drawn from reviewing the industry history can be useful in today's world. Also, this is great trivia source material. The first software patent, the turf war issues of what industries could offer computer services, the debt the industry owes the courts and the FCC are all presented as originally published.

The Gray Sheet was IDC's executive newsletter that provided industry insight and analysis between 1964 and 1999. In keeping with modern times, the new, online incarnation of IDC's executive newsletter is *IT Forecaster,* available at www.idc.com/itforecaster.

Executive Summary

In reviewing the past 36 years of the information technology industry as chronicled by International Data Corp.'s newsletter most commonly known as *The Gray Sheet*, the following trends appear:

- The courts and the FCC played important roles in shaping the industry, as we know it today.
- IBM's actions facilitated the birth and decline of the leasing industry and the plug compatible manufacturers.

We should be grateful for many elements of our industry that are constants today but were once merely novel ideas in pioneers' eyes. These include:

- Independent software industry. Once upon a time, all software flowed from the systems supplier.
- Data communications equipment industry. Once upon a time, Ma Bell could prohibit any "foreign" attachments.
- Competitive data communications transmission options. You get the idea.

We've come a long way, through dint of a combination of genius on the part of more people than will ever be acknowledged and hard work by the increasing throngs creating and using IT products.

If one dared to nominate hall of fame members, for starters we'd put forth:

- Marty Goetz, Tom Carter and Bill McGowan for reshaping the software and communications sectors of the industry in the early years.
- Grace Hopper et al, Tom Kurtz and John Kemeny, and Gary Kildall for advancing languages and squeezing an OS into a tiny space.
- Other software pioneers of note: Jim Gray of System R, IBM's relational database concept; Dan Bricklin and Bob Frankston, for the first true killer application on a PC; the team at Parc and Doug Englebart for wysiwyg, the concept of communities and the mouse; Jef Raskin and the Mac team for commercializing a friendly interface; Ted Nelson for the concept of hypertext and Tim Berners-Lee for designing the World Wide Web.

We also salute all those who created and refined advances in chip technology. For without Moore's law as a reality, things would be different indeed.

To illustrate the dynamism within the industry, the mugs and T-shirts often outlive the companies.

As the tsunami of available venture capital and the lure of near-instant wealth propels the savvy doers to jump ship to the next new IPO, one has to wonder who will be left to steer the new companies into middle age. Indeed, the lure of instant wealth may contribute to the perpetuation of the fact that mugs outlast companies.

As a summary, in 1979 *The Gray Sheet* categorized the decades:

- 70s – Decade of the DP shop
- 80s – Decade of the Office
- 90s – Decade of the Home

In the future, our eyes are watching with interest the advances in embedded and wireless systems. And who knows – perhaps we will soon see the age of the intelligent home. But it will be like the "year of the LAN." By the time it arrived, analysts had ceased commenting on when the proclamation would be justified. In other, perhaps more important arenas, medical testing in a chip is here, and biocomputers are on their way. Gads.

Although not every moment of importance is included, we hope you will agree the selection gives a flavor of most of the IT industry in the latter half of the 20th century.

Enjoy the future!

Compiled by Molly Upton

The Scriveners

Thanks to all the chroniclers: Pat McGovern, Jim Peacock, Fred Anderson, Bill Leitch, Carol Chapman, Tom Geyer, Nancy Scull, John Gantz, Dale Kutnick, Molly Upton, David Moschella, Donald Bellomy, Doug McLeod, Peter Burris, Ted Julian, Bill Manning, Rick Miller.

Note to Readers:

The Overview is presented in chronological order and indicates by page number the 17 issues we have selected for reproduction in whole or in part.

In order to assist you in putting these events in context, we have also included in the Overview mentions of additional issues that are not reproduced and have no page numbers associated with them.

We have also taken the liberty of including in the Appendix four additional issues which dealt with industry retrospectives and predictions.

Because of the age of the original documents, reproduction quality may vary.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
1	1	1	3/23/1964	Hardware	IBM 360	IBM Expects to Install 5,000 of its New Computer Systems in Next Five Years	IBM Expects to Install 5,000 of its New Computer Systems in Next Five Years
2	1	8	7/15/1964	Timesharing		General Electric Obtains Advanced Position in Computer Time-Sharing Field by Winning MIT Project MAC Award	To date there are only a handful of time-sharing projects in the U.S.... the most carefully watched of which is Project MAC. However the results from these projects are encouraging enough to cause many experts to speculate that within five years a substantial part of scientific and engineering computation will be done by time-shared computer systems with individual technical people presenting their own problems to a computer via a console located at their work station.
3-7	2	12	11/15/1966	Datacom	FCC Computer Inquiry 1	Upcoming Inquiry by FCC will Take a Hard Look at Growing Cooperation/Competition Between Computer and Communications Companies.	Among the topics in the Pandora's box that is being opened: a review of al regulations that currently affect data communications; a determination whether the FCC or some new agency - should have regulatory authority over information processing and services; and appraisal of possible interconnections between private setups and common carrier facilities. The results of the inquiry could have major effects on companies in both the computer and the communications industry.
8-16	2	14	3/15/1967	Software	Packaged	Growing Number of Independent Firms Offer Software-for-Sales Packages in Hopes of Multiple Sales and Attractive Profits on Single Cost Product	Although the amount of software-for-sale is not large, the very fact that this product is being marketed in the computer industry is significant. Until recently, independent software selling existed mostly in the dreams of avaricious programmers.
17-19	3	3	7/28/1967	Services	Banking	Data Systems, Inc. Sues a St. Paul Bank for $100,000 as Adapso Launches Attack on Right of Banks to Offer Data Processing Services	With each passing week it looks more and more as if a large part of the computer's future may well be decided by the courts.
	3	10	11/19/1967	Datacom	Add-On Gear	GE Introduces Full Line of "Bell-Compatible" Data Transmission Equipment; Move Implies Direct Confrontation With AT&T Over "Foreign" Attachment Policies	...some standards should be devised so that responsible manufacturers can provide equipment that can be attached to the communications circuits, in the same manner that many companies make electric appliances that will operate on the power provided by electric utilities.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
	3	21	5/15/1968	Software	Unbundling	Separate Pricing of Software and Hardware Is Talk of the Industry; But its Adoption Might Lead to Undesired Results	Current pricing practices -- with software treated as a "free" product included with hardware -- may be in violation of the anti-trust laws according to the statement by Richard C. Jones, president of Applied Data Research.
20-21	3	23	5/11/1968	Datacom	Carterfone	Data Communications Terminals No Longer Must Depend on "Data Phones" as FCC Rules that Modem Restriction by AT&T Is "Unreasonable"	In the order effective July 29, 1968, the FCC made a much more sweeping decision than was necessary in the case being considered.... Of perhaps more importance, however is the implication of this ruling on the eventual outcome of the FCC's inquiry into the interrelationships between computers and communications (EDP/IR Nov. 15, 1966). ...But the wrist-slapping of AT&T would at least suggest that the FCC, as it has said all along, is going to give a fair hearing to the voices from the computer industry.
22-24	3	23	5/11/1968	Software	Patent	First Patent on Software, Awarded to Applied Data Research, Reopens Industry-Wide Discussion on Problems of Program Protection	Proposed patent reform legislation, now under study by Congressional committee, at one time contained a provision (Section 106) that would eliminate the patenting of computer programs. The final bill will certainly be influenced by industry's reaction to the software patent.
	4	9	12/23/1968	Antitrust	CDC vs. IBM	Paper Machines and Phantom Computers	Two broad violations of law are charged by CDC: "monopolization" and "attempt to monopolize." Backing up these charges, the complaint gives 12 specific paragraphs outlining IBM's "monopoly power in the computer markets and submarkets" followed by a list of 37 "specific exclusionary practices."
	4	10	1/9/1969	Antitrust	CDC vs. IBM, DPF&G vs. IBM	Points of Law Take on Increasing Importance as Legal Action Against IBM Continues	CDC and DPF&G Suits Vs IBM cite Sections 1&2 of Sherman Antitrust Act and Section 2 of Clayton Antitrust Act as amended by Robinson-Patman Act and Section 3 of Clayton Antitrust Act.
25-31	4	11	1/28/1969	Antitrust	US vs. IBM	Justice Files Its Antitrust Suit Against IBM	Unlike the complaints filed recently by Control Data and Data Processing Financial & General ... the complaint filed by the Justice Dept. in the Southern District of New York is instituted only, "to prevent and restrain the continuing violation of" Section 2 of the Sherman Act. This antitrust law involves "every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize...." It is used less often than other antitrust legislation.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
	4	16	4/24/1969	Antitrust	ADR Vs IBM--Unbundling	Software's "Pseudo-Price" Described as "Zero-Dollars"	Software is defined in the complaint as a "device used as a control attachment and machine extension for the hardware." As such, goes the allegation, the supplying of software as part of the system "bundle" is a tie-in sale that violates the 1956 consent decree.
32-38	4	20	7/14/1969	Software	Unbundling	Sharp Cost Increases Expected From IBM's Unbundling	The new policy does make quite a radical change in the way IBM does business, in fact, and by the time all the twists and wrinkles are ironed out, the computer marketplace will be covered with a whole new cloth....(From EDP/IR May 15, 1968): Proponents of separate pricing admit that it will take IBM action to make it work, and yet such action might simultaneously make competitive survival more difficult for other computer manufacturers, force independent software suppliers to offer more service at reduced profit margins, and put many computer users in a position of having to pay more for less.
	4	21	7/30/1969	Software	Unbundling	Unbundling Brightens Spotlight on Software Capitalization; Ruling Expected From IRS Could Up Tax Bill for Computer Users	However, what is often overlooked is that IBM is offering its programs only on a rental basis. This will tend to convert the software marketing business to a rental basis, requiring firms to be heavily capitalized before they can mount a major software development program . . .pushing the odds for success toward the bigger software houses and the mainframe manufacturers.
39-45	5	11	4/9/1970	Computer Inquiry 1	Services	FCC Announces Tentative Decision in Computer/Communications Inquiry; Data Processing Services Termed "Competitive" and Won't Be Regulated	Thus, after three and a half years (EDP/IR Nov. 15, 1966), the Inquiry is closed. Data processing, including remote processing, will not be regulated. Thus, because of the 1956 consent decree, AT&T is locked out of the pure data processing business; but, such services offered by other common carriers will not be tariffed. To offer data processing services, however, other common carriers will have to set up separate subsidiaries.
	6	3	12/23/1970	Trade	Protectionism	Potential World Reaction to Pending Trade Bill Threatens International Business Of American EDP Companies	The time has come, the Walrus said, "To talk of many things: Of shoes-- and ships-- and sealing wax-- Of cabbages" -- and computers.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
	6	16	6/25/1971	Minicomputer	Overview of Mini Market	With User Demand Expected to Produce 20% Growth in Numbers, Minicomputer Shipments Could Zoom as IBM Adds Structure to Market	....minicomputers have begun to represent an economical state of mind rather than a necessary element in a system. It is their function that is needed. ... Collectively, they represent the first extension of computer concepts into other portions of capital equipment and at least the working environment of most people. Their functional equivalents, more and more, will be hidden within everything mechanical that people use.
46-53	6	19	7/30/1971	Datacom	FCC OKs Independent Specialized Carriers	40%-50% Growth Projected for Data Carriage and Interconnection Gear After FCC Decision Kicks Off Data Transmission Free-for-All	On May 15, 1971, the FCC announced a unanimous decision which has thrown open the market for data (as well as leased-line voice) transmission. It says that any qualified firm may provide public communications as a specialized carrier.
	6	24	10/19/1971	Datacom	Data Under Voice	AT&T Announces New Data Transmission Technique as MCI Moves Ahead	With this technique -- not yet fully described by Bell Labs -- AT&T will only have to add interconnection equipment -- not additional transmission facilities -- to provide a "rapid expansion" of digital data service across the U.S..... In 1974, EDP/IR projects direct data input will be playing a significant role in information processing.
	6	24	10/19/1971	Terminals	3270 Introduction	IBM Apparently Drops 360/20 as it Beefs Up System/3; Some Card Use Perpetuated as Most 360s and 370s Get 96-Column Capability	IBM's role as a CRT terminal supplier is generally underrated. Of the 40,000 or so general-purpose CRTs used with computers in the U.S. today, IBM has supplied about three-fourths. EDP/IR expects the installed base of general-purpose CRT terminals to grow from the 40,000 level of today to over 200,000 by 1975.
	7	19	8/15/1972	Storage		IBM Selects Virtual Storage for the Seventies	This was the real System/370 announcement . . . A software announcement . . . A definite turning point in the mainstream of computer usage. And buried in the announcement details were hints of IBM's possible New Computer Economics.
	8	12	4/12/1973	Microprogramming	Advent of Microcomputer	Following the Lead Quietly but Actively Pursued by Mainframers, Several Minicomputer Manufacturers Substitute Microprogramming for Software	The threat of such computers-on-a-chip as they often are called, may be real a few years hence; it certainly will be closer to reality if, as EDP/IR expects, Computer Automation successfully introduces its "computer on a card" next month.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
	8	16	1/19/1973	Antitrust	IBM Exits Services; CDC Gets SBC in Suit Settlement	Four-Year-Old Antitrust Suit Settled as CDC Buys Service Bureau Corp. From IBM	IBM President Frank Cary said "This settlement gives fair value to both sides." CDC President William C. Norris provided the explanation when he said "Since we have settled our case we have, as is customary, discontinued our efforts toward preparing for trial and our attorneys have disposed of their work product."
	9	23	8/28/1974	Hardware	Information Appliance	Micro Versus the Mini . . . Is There a Contest? Mini shipments Not Threatened as Microprocessors Stake Out New Territory	The future could find micros in such diverse places as in the home washing machine, on the electronic football field, or even someday under the hood of the family car. . . . As for the minicomputer manufacturers, if their current shipments won't be affected by the microprocessor revolution, at least the prices and eventual look of their product lines will. Like DEC and GA they can choose to co-opt the technology for their own uses, or, like Hewlett-Packard they can ignore it and focus on the lower end of mainframe markets. But when the 16 bit "processors-on-a-chip" hits the street in a year or two (and after that the 32 bit machine) then look for a radical change in product architecture, if not a rearrangement of the industry hierarchy.
54	15	22	5/23/1980	Datacom	Computer Inquiry 2	FCC Rubber Stamps Marketplace Realities with Computer Inquiry 2 Ruling	For several years, since 1966, the FCC has been struggling with defining a demarcation line between computers and communications and who can offer what to whom.... All carrier-provided terminal equipment will be deregulated. [Enhanced network services (combining computer processing with voice and data transmission capability) will be unregulated.] Only GTE and AT&T need to have separate subsidiaries for regulated and unregulated activities.
55-59	16	2	6/18/1980	Datacom	Cable, satellites, infotainment	Multiple Transmission Media Join Throng Promoting Infotainment Services	"The times they are a changin." -- Bob Dylan. One thing is for sure; most of the ingredients necessary for the next quantum leap in Americana are present. [discusses interactive cable, Compuserve offered via Radio Shack for $25/mo, satellite TV]
	16	14	11/28/1980	Workstation	Distributed Systems	Distributed Intelligence Networks Emerge; Challenge Minis, DDP Systems	In the 70s we had the mini challenging the mainframe; in the 80s we have the micro packaged as a system, equipped to challenge the mini

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
60-63	16	17	1/16/1981	Future cast	80s Trends	Decade Begins with "Deregulation" as Byword; On other Fronts, Focus Shifts to Software	Software... in 1981 should dominate as the most important aspect of the computer industry.... Other trends EDP/IR sees: Move toward consumer-oriented marketplace affecting channels of distribution, services, desktops, information appliances, and more concerted thrusts into the home.
	16	24	5/11/1981	PC	Star	Xerox, General Electric Assemble Pieces to Attack Information Arena - Again	So, once burned in the computer room, Xerox may find its home ground in the upstairs offices fertile enough for the kind of growth it (had) gotten accustomed to . . . And the way to information processing through another door. -- EDP/IR, July 30, 1975
	17	7	8/7/1981	Datacom	X.25, SNA	IBM Opens Doors to Packet Nets; Honeywell Welcomes SNA	That IBM is accepting X.25 may indicate that eventually it will accommodate the OSI model as well, especially since over the last year IBM has expressed its support for the project.
	17	8	8/21/1981	PC	IBM PC	IBM Crashes Personal Computer Party	5150 dubbed "acorn." In an unusual move for IBM, it went outside to get the parts -- a Japanese (Epson) printer, a Taiwanese screen, floppies from Tandon, and a 16-bit Intel 8088. How this will affect availability and profitability remains to be seen.
	18	7	7/16/1982	Datacom	Deregulation, EDI	Baby Bell's First Product Marks Beginning of Deregulated Era; Renamed ACS Finally Heads for the Starting Blocks	Thirty years from now... the deregulation of AT&T will be seen as a key inflection point in the history of the information industry. Despite all that computers have accomplished to date, until data can be freely exchanged between different individuals, organizations, and machines, the nation will not become a true "information society." And AT&T is perhaps the one organization capable of bringing this about.
	17	21	2/24/1982	Services	IBM Services; Flashback to 1956;	IBM Reenters Services Business; Targets Remote Problem Solving Market	It's not a service bureau; it's not a service bureau; it's a remote interactive computing operation. That's the message from Armonk, where the word services is so taboo that a five-page press release describing the new offerings never even uses the word.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
	19	4	6/20/1983	Database	DB2	IBM Unveils Full Relational DBMS; Tightly Coupled MVS/XA Design Suggests More PCM Headaches	Perhaps it is no coincidence that IBM has unveiled an aggressive DBMS product. Research by International Data Corp. reveals that 1982 was the first year that independent vendors brought in more DBMS revenues than their hardware manufacturing counterparts....But much more importantly, good end user tools will become the key to maintaining mainframe hardware sales.
64-68	19	6	7/8/1983	PC	PCs>Mainframes	U.S. Personal Computer Market will Surpass Mainframes by 1984; Demographics Seen as only Market Boundary	But more than just creating instant millionaires and exciting new sub-industries, the rise of the personal computer (PC) almost guarantees the information industry's future success. By dramatically expanding the user base, PCs have exponentially increased the material and cerebral resources being focused on the use of information technology. The benefits will surely follow.
	19	19	1/30/1984	PC	Mac	Apple Stands as Major Alternative to MS/DOS Systems; Macintosh Grabs Lead in Technology Race	But because Apple has refused to bend with the prevailing winds [of adopting MS/DOS], the micro industry is about to witness the largest of its many marketing wars.
69-70	28	11&12	4/16/1993	Internet	Information Distribution	Changes in Creating, Distributing and Displaying Information: Four Views	circa 2005: Eventually carriage will become almost entirely technology neutral. Standards between hardware, software, transport and services will mean that neither artists nor end users will know, nor will they care, which medium is transporting their services and information.
	29	23	10/28/1994	Internet		So What if There's Hype? The I-Way Is No Byway, but the Road to the Future	Beyond the I-Way will be the information society, which will be defined by the arrival of truly all-digital multimedia content.
71-78	30	9	3/31/1995	Internet		The Information Highway -- Will You Surf It or Get Pummeled in the Sand?	The Internet represents the most fundamental shift in business practices since the onset of widespread use of credit cards in the 1960s. It has begun to alter the face of commerce radically and reorient the celestial axes by which IT suppliers have traditionally charted their course.
	30	10	4/28/1995	PC	Home PC	Home Is Where the PCs Are: The Home Computer Market Comes of Age	The cat is out of the bag. The home computing market has emerged as perhaps the strongest driver of growth in the IT market.
	30	23&24	1/31/1996	Internet	Wired Consumer	The Era of the Wired Consumer: Detailing a New Vision for the IT Industry	IDC calls this new wave the "Era of the Wired Consumer" because the connection of consumers into an online marketplace will be the primary catalyst for the next wave of IT growth.

Page #	Vol.	Issue	Date	Category	Subcategory	Headline	Quote
	31	11&12	7/31/1996	Internet	Netscape	Netscape Takes on the Microsoft Empire: Will JavaSoft Open a Second Front?	The latest technology turn is being driven by the Internet. As a result, Microsoft's once seemingly unassailable claim to the desktop is for the first time under assault.
	33	15	11/15/1998	Internet	Hosting and Application Service Providers	Web Hosting -- The Time Has Come	Web hosting and the related field of application outsourcing bear remarkable resemblance to service bureaus. Remember them?
Appendix	**The Gray Sheet Reflects Along the Way**						
A1-13	15	12	12/29/1979	Industry Perspective		The 70s -- Decade of the DP Shop; DPers Ride Technology Curves, Survive Supplier Shifts	70s -- Decade of the DP shop; 80s -- Decade of the Office; 90s -- Decade of the Home
A14-18	19	23	3/31/1984	Industry Retrospective		A Look at the Changing DP Landscape as Gray Sheet Celebrates 20th Anniversary	
A19-38	28	20&21	8/27/1993	Industry Retrospective		A Pictorial Perspective on 30 Years of Change	
A39-40	29	11	4/15/1994	Industry Retrospective		Thirty Years of Change, Part II	

March 23, 1964 Vol. 1, No. 1

HOW THE COMPUTER BUILDERS WILL DIVIDE THE $225 MILLION GOVERNMENT PURCHASE OF EDP EQUIPMENT...PAGE 6

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P.J. McGovern, Editor
Telephone 617-332-8840

IBM EXPECTS TO INSTALL 5,000 OF ITS NEW COMPUTER SYSTEMS IN NEXT FIVE YEARS

Unofficial estimates given to us by a marketing spokesman at IBM's Data Processing Division indicate that IBM expects to install 5,000 units of its as yet unannounced new computer series in the next five years. This number represents a cumulative purchase cost of over $3.5 billion. First models of the new computer series are expected to be installed in the summer of 1965. The smaller computers of the series will be installed first, with the larger machines scheduled for delivery early in 1966.

The announcement date for the new series is expected on or about April 7th. The main features of the family of computers will be:

- equivalent processing power at about one-half the cost of 1400 and 7000 series computers.

- a compatible, integrated series of binary machines. The word length for the larger machines will be 64 bits, while 32 and 16 bits will probably be used on the smaller members of the computer series.

- a range of rental prices starting at $2500 per month and going up to $120,000 per month for the giant member of the series.

- the use of hybrid circuitry (active circuit elements deposited ona substrate containing passive elements) in the processors of the new series, reducing it to one-sixth the size for equally powerful transistored CP's.

- the processing units will operate in a byte-by-byte mode. Data to be processed will be transmitted to high-speed micro-ferrite core memories (size = 1 to 4K; cycle time = .3 usec.) where the control unit will select the data character by character and forward it to the processors. The flow rate of bytes through the processing units will be about 3.3 million per second. A byte is a group of bits used to encode a character. The byte size for the series will probably be eight bits.

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uly 15, 1964 Vol. 1, No. 8

SPECIAL FEATURE THIS ISSUE:
Collins Radio's Expanding Role
in the Computer Field.....Page 5

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

GENERAL ELECTRIC OBTAINS ADVANCED POSITION IN COMPUTER TIME-SHARING FIELD BY WINNING MIT PROJECT MAC AWARD

GE's computer department received several days ago what is probably its most significant new computer order since it landed the original ERMA contract from the Bank of America back in 1956. The order, from MIT's Project MAC calls for a modified version of GE's new 635 computer... the upper end of GE's newly introduced Compatibles-600 line. The leasing price of the GE computer at MAC will be about $100,000 per month.

The Project MAC award comes as an important breakthrough for GE into one of the most important new developments in the application of computers... multi-station access to a computer on a simultaneous basis by "time sharing" of the central processor. This technique is expected to increase significantly the number of people who can receive substantial problem-solving aid from a single computer system and also reduce significantly the time between when a problem is first conceived and when the computer begins to process it.

To date there are only a handful of time-sharing projects in the United States...the most carefully watched of which is Project MAC. However the results from these projects are encouraging enough to cause many experts to speculate that within five years a substantial part of scientific and engineering computation will be done by time-shared computer systems with individual technical people presenting their own problems to a computer via a console located at their work station.

The selection of the modified 635 indicates that the MIT group has determined that the new GE equipment is currently their "best buy" in computer hardware for time-sharing systems. The MAC group considered proposals from most of the major computer builders in making their choice. Significantly, IBM's offering of a multi-computer configuration of a System/360 model 50 was by-passed even though MIT has had a close relationship with IBM since the first 650 computers were installed at the Institute over ten years ago...in fact, GE's equipment will replace a 7094 currently being used for Project MAC work. Both the delivery date of the System/360 as well as its systems design worked against its selection.

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November 15, 1966 Vol. 2, No. 12

SPECIAL FEATURE THIS ISSUE
Monthly Computer Census. . . . . .Page 6

E|D|P
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UPCOMING INQUIRY BY FCC WILL TAKE A HARD LOOK AT GROWING COOPERATION/COMPETITION BETWEEN COMPUTER AND COMMUNICATIONS COMPANIES

A sweeping inquiry into the interrelationships between computers and communications is about to be launched by the Federal Communications Commission. It will be, perhaps, the broadest such inquiry the FCC has ever held. Among the topics in the Pandora's box that is being opened: a review of all regulations that currently affect data communications; a determination whether the FCC - or some new agency - should have regulatory authority over information processing and services; an appraisal of possible interconnections between private setups and common carrier facilities. The results of the inquiry could have major effects on companies in both the computer and the communications industry. Also, the outcome could have a major bearing on all the companies presently pioneering in the "information utility" business.

The competitive overtones are played down by the principal participants, but they are quite clear. At present, IBM and AT&T take a quiet and noncommital attitude; but the inquiry could evolve into a major battle between IBM and AT&T. Both have high-level task forces at work to figure out what the company positions will be. Interested parties hope the inquiry will be an opportunity for open discussion on a series of very complex issues, but they fear entrenchments that will only harm progress in a rapidly developing and evolving field.

Why the inquiry?

Several special cases have laid the groundwork for this inquiry:

• Bunker-Ramo Corp., in establishing Telequote IV, proposed not only to supply information on securities but also to forward messages. Thus, a broker using the service could transact stock sales and purchases. The common carriers didn't want to provide communications circuits on the grounds that Bunker-Ramo would be reselling them. The carriers finally consented to provide service after Bunker-Ramo convinced them it qualified to act as a communications broker. Control over this type activity, however, still apparently rests with the carrier rather than with a regulatory agency.

• Western Union, which is trying to buy the TWX network from AT&T and thereby control the record communication service in this country, was criticized by the FCC for not filing a tariff on the computer services it offered customers. The company has solved the problem, for the present, by separating charges for data transmission from those for computation. This type situation, however, could make life harder for outside users in the future, as transmission gets harder and harder to segregate from other services.

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These specific cases - along with a few others - merely illustrate the fact that more and more businesses are operating in areas that might come under jurisdiction of the FCC. The inquiry, therefore, should be an excellent opportunity for interested parties to speak out without bringing a specific case before the commission, an action that many companies are prone to shy away from.

The notice of the inquiry is quite thorough in its review of "the convergence and growing interdependence of the computer and communications." It starts with a description of four types of "emerging computer enterprises" that rely on time-sharing and/or multiple-access computers and that therefore imply substantial use of communications channels:

1. In-house computer systems - at banks, aircraft companies, and universities, for example - already have or soon will have more than enough capacity for the prime user. This extra capacity is easily saleable via time-sharing terminals.

2. Service bureaus operated by major computer manufacturers are rapidly converting to time-sharing and establishing data banks that can be used by many customers for such tasks as economic forecasting and marketing analysis.

3. There are hundreds of non-manufacturing firms that offer information services. Many are local in scope, but others are equipped with multiple access computers and are trying to develop widespread time-sharing systems.

4. The growing list of highly specialized computer services combine data processing and communications. Among these are stock quotation services, hospital information services, coordinated law enforcement services, and various kinds of reservation services.

In addition, there are many computers that can be programmed for message and circuit switching as well as data processing. Thus, data processing and message switching can be effectively combined with communication channels to form a real-time processing and communications system. Indeed, many of today's time-sharing services are doing just this to cut down communication costs for their users.

On the other hand, the notice continues, the common carriers are rapidly becoming equipped to enter the data processing field. Central offices are being converted from electro-mechanical to electronic switching systems. The computers that do switching can also be programmed to perform data processing functions. Thus, the carriers are moving into position to operate information utilities. Western Union, in fact, has announced that it is going into this business and has already made several moves in this direction: It is operating data processing centers in key cities; it provides private communications systems for business customers; it has announced special services such as one for matching job hunters with potential employers. As soon as most of its communications network is switched by computer, it will be able to offer even more generalized services.

The Bell System, by contrast, has yet to indicate that it plans similar services; it doesn't even offer local data processing services to the public. But it does have a large stake in information utilities. In addition to supplying communication links for most services, it builds the Teletype and the Touch-Tone telephone, both of which are used as remote terminals. Indeed, adaptations of the Touch-Tone instrument could be the basis for remote home or office terminals in the near future.

International common carriers are also getting into the act. ITT offers a message switching service to airlines; it plans to use the same computer that does the switching to store and supply up-to-the-minute seat inventory information. Other carriers, the notice says, plan to introduce similar service offerings.

The problems involved

The remainder of the inquiry notice discusses current and projected problems that seem to face computer or communication companies, then lists specific points upon which it invites response from interested parties. These break down, roughly, into four broad categories:

1) the basis for charges and the possible need for regulation in message switching, data processing, general or special information services, or any combination of these;

2) whether tariffs should allow the interconnection of private and common carrier facilities, with rate structures not based on time and distance, but perhaps on the quantity of information transmitted; and whether there should be shared use of equipment and services offered by common carriers, or restrictions on use of such services, including prohibitions against resale;

3) whether the service and practices of common carriers are keeping pace with the quickened developments in digital technology and whether there is a gap between computer industry needs and communications technology and practice;

4) how both the computer industry and the common carriers can protect the privacy and proprietary nature of data stored in computers and transmitted over communication facilities.

We have talked to the major parties that will be affected by the inquiry. Here is the current thinking - and opposing views - on each side of the ledger.

Regulation of services. There is general agreement on the first category. Communication companies think that regulation should extend to all organizations offering the same services, or to none. The attitude of computer companies is probably best summed up by IBM's statement that there is a difference between data transmission and data transformation, and that only data transmission should be subject to regulation. If a communications company wants to get into information services, the computer people argue, let them separate the charges for the two phases of the service so that a reduced rate for the transmission portion of the service won't subsidize the data portion of the over-all service. Assuming something along these lines is agreed upon, and all services except actual data transmission remain competitive as at present, the only problem seems to be that of message switching. The solution probably will be that message switching, by itself, will be subject to regulation; when, however, it is performed in conjunction with some other information service, it will be considered part of a total package priced at what the market will bear. This resolution would allow common carriers to get into the information service business. With AT&T thus a potential competitor, the computer companies might hold out for a more rigid restraint on common carriers.

Interconnection of services. The second category - which concerns itself with the interconnection between private and common carrier facilities - probably is the most discussed among computer people, especially those who are connected

with time sharing. It is also a subject on which the major carriers have a firm position. For one thing, a liberal policy under this category could well stimulate future competition, and no firm wants to encourage an erosion of its share of a profitable market.

• Rate structures have been a bone of contention among some large users of computers and communications. One of the industry's outstanding spokesmen says: "We are time sharing computers but they (the carriers) aren't time-sharing communications. They must change their method of switching, which is appropriate to the days of telegraphy." AT&T, on the other hand, claims it uses the most efficient possible switching network, when peak loads are considered. In any event, large users would like to pay only for actual transmission time used, with lines perhaps being shared by many users. This is possible with a private network, but these can't feed into the public networks at the terminal end. Thus even large private communications systems, practical with satellites, would still not be able to serve users unless there were private lines to the distribution point. This point will certainly lead to a spirited discussion between the two factions involved.

• The terminal itself is another area of conflict. This is potentially as large a market as that for central processors, or larger. Yet, under existing regulations, AT&T must supply the Modems (modulation-demodulation equipment) for any terminals connected to its public communications network. Other companies can and do make similar equipment for private networks, but AT&T says with some justification that it needs to own this equipment so that it can make changes within the system. "We can't let a terminal control the evolution of the communications system," a spokesman says. However, AT&T may have to concede some of this business to responsible manufacturers.

• The matter of technology also brings outspoken reaction from computer users but equally firm comment from AT&T. The telephone people claim that we're just experiencing another growth situation and that its service will keep pace with improvements in technology. Sophisticated computer users claim, however, that what is developing is revolutionary, not evolutionary, and that a new approach is necessary to prevent the voice network from being swamped. Spokesmen hope that the inquiry will provide the legal framework that's needed to encourage the common carriers to aggressively explore new technologies. They must be provided with an atmosphere, says one authority, to sit back, decide what services should be offered, then work out a way of providing these. There certainly are advanced data transmission techniques to be experimented with on a commercial basis, and people who question the technological proficiency of the communications industry hope that, as a result of the inquiry, an atmosphere can be developed to encourage experimentation.

• Everyone agrees that privacy is essential to developing vast information systems for a country such as the U.S. Common carriers have always lived with secrecy of communications, and claim there are no unsolvable problems as we go to more and more data transmission and computation over communications lines. And they, the equipment manufacturers, and computer users agree that the hardware to guarantee this is here. But it boils down to a matter of public policy as to who decides what information searches are legal and how to certify that privacy is protected. Thus the inquiry could go a long way toward clarifying this situation. Control of privacy may well require another government agency, or expanded powers for the FCC, but this step may well be necessary so that the public is protected from misuse of vast collections of personal or proprietary data banks.

Conclusions

The information utility, we feel, should be given a chance to succeed as a business venture. It should be charged, therefore, communications costs based only on the quantity of its commodity it sends over the wires. This business has few of the characteristics of other utilities and, indeed, perhaps is misnamed. At present, and for the foreseeable future, ingenuity and programming skill are far more important to success in this field than is the ownership of vast plant and equipment. Communication channels are necessary, and should be provided by the carriers authorized by law to build facilities that cross private and public property. These services should be maintained and improved to handle the increasing loads that development of information services will bring. They should also be fairly priced to whomever wants to use them.

Provision should be made for interfacing private networks with those of the common carrier, and some standards should be devised so that responsible manufacturers can provide equipment that can be attached to the communication circuits, in the same manner that many companies make electric appliances that will operate on the power provided by electric utilities. We see no reason why the carriers should be prevented from starting computer utilities, but there should be very stringent regulations that require them to separate transmission costs from other expenses and not to subsidize information services with income from voice or data transmission charges. This, especially in the case of AT&T, would probably require the establishment of a separate company that paid for its transmission costs the same as any other company.

New regulations will be necessary to insure that competition is maintained, and this requires an enlightened attitude on the part of the regulatory agency. Also, protection of privacy is essential to the growth of information services, and should be well examined and regulated as a matter of public policy.

This inquiry - which could well be the broadest ever conducted by the FCC - could move all parties involved much closer to a workable arrangement for the future. It also could set the pace for developments over the next several years in both the communications and data processing industries. All parties involved, naturally, will try to protect their own position and future. But a friendly intercourse that exposes potential problems and educates all participants could lead to regulations that insure everyone a fair chance in the competitive marketplace. Also, it should lead to balanced communications-computer interaction as more people take advantage of convenient services assisted by the computer.

James Peacock, Associate Editor

GENERAL ELECTRIC AND DARTMOUTH TEAM UP IN LARGE-SCALE PROGRAM TO DEVELOP AND USE TIME SHARING ON THE GE 625

A General Electric 625 computer, recently installed at Dartmouth College (Hanover, N.H.), will soon provide a large-scale time-sharing service that reflects the closest interaction yet between a university and a computer manufacturer. In essence, GE gives Dartmouth the computer and in return the school's computer personnel and undergraduate students write an executive routine and a conversational language for the machine.

During the next three years, GE and Dartmouth will split the use of 200 terminals attached to the 625. After that, the machine becomes Dartmouth property. In the interim, Dartmouth will connect to the machine through two Datanet 30's

(Continued on page 8)

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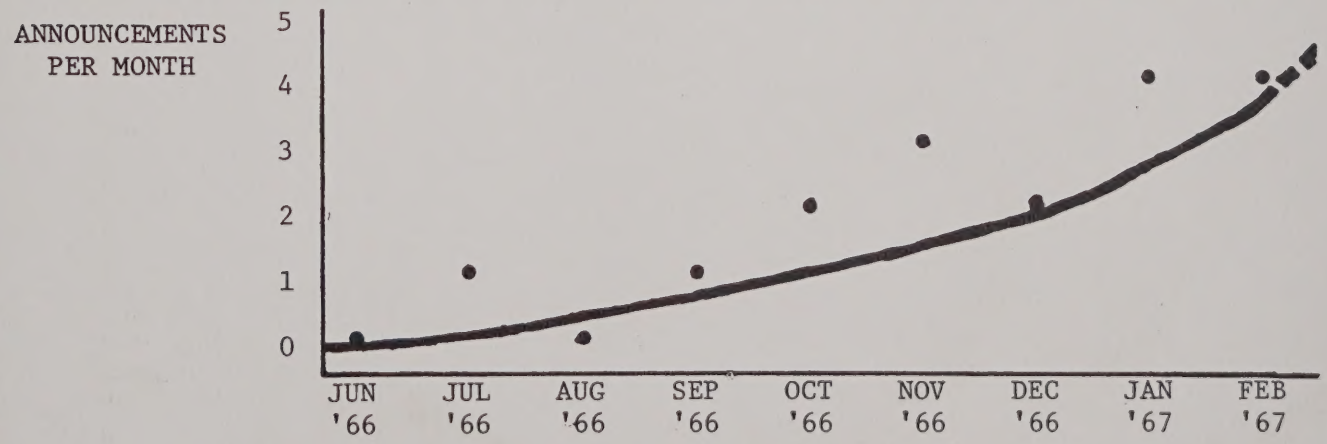
GROWING NUMBER OF INDEPENDENT FIRMS OFFER SOFTWARE-FOR-SALE PACKAGES IN HOPES OF MULTIPLE SALES AND ATTRACTIVE PROFITS ON SINGLE COST PRODUCT

That long-awaited phenomena -- packaged, off-the-shelf software -- is finally emerging as a commercial reality in the computer marketplace. During the last six months, as Figure 1 indicates, the number of software packages offered to the computer user has been growing rapidly. Although the amount of this software-for-sale is not large, the very fact that this product is being marketed in the computer industry is significant. Until recently, independent software selling existed mostly in the daydreams of avaricious programmers.

These specialized software offerings, with one exception, do not come from computer manufacturers, themselves busy perfecting basic operating systems for their new families of machines. (SDS has announced a COBOL package, developed by an independent company, which it will sell or lease to users of its Sigma series.) Rather, a growing number of consultants, software specialty houses, and large think factories have developed packages of software-for-sale and are busily touting their wares before the computer user through advertisements in the technical press and at booths in trade shows.

The types of packages vary almost as much as the groups putting them up for sale: Most fulfill a special need too small or too bothersome to be handled by the computer manufacturer; these programs, therefore, arise out of a specific need

FIGURE 1
RECENT INCREASE IN ANNOUNCEMENTS OF SOFTWARE-FOR-SALE PRODUCTS



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and fit no obvious pattern. The only apparent trend -- and it most likely is a temporary one -- is toward translators that bridge the gap between second generation and newer computers similar to the "Liberator" program Honeywell developed to translate 1401 software for its H200. A number of firms, independently, have developed software packages that allow programs written for older computers to operate on the growing number of IBM 360's. These, perhaps, could cut the use of emulators by allowing users to get more performance out of their 360 equipment at lower cost.

The pattern of pricing for independent software is as diverse as the product. When packages are sold outright, they usually cost between $10,000 and $20,000; when they are leased, the annual rental is usually in the $2,000 to $10,000 range. One company has established a decreasing annual charge that drops to zero after a few years.

The emergence of this marketing activity, however, does not guarantee a solid, long-term software business opportunity. There are problems. The seller is worried about protecting his product; the buyer has little flexibility in using the product; both are vexed with justifying a price on something the user is accustomed to getting free.

Also, the role of computer manufacturers is uncertain. There is a real question as to whether the major manufacturers will ever price some software separately from hardware. If they do, such action should help the independent market. But it is not a likely route to be chosen by the manufacturers because they consider software an integral part of their product and would not want to open its "value-added" contribution to widespread competition. However, the Federal Government has been seeking to identify how much of its computer bill is for software, and firm action by the GSA could force a breakout of software pricing.

Last year, EDP I&MR estimates, sales of prepackaged software by independents were less than $2 million. (See Table 1 for recently announced packages.) We expect this market to grow to many times this amount by 1970, as the number of potential customers is almost as large as the number of computer installations. The business is an easy one to enter, since software-for-sale products are usually paid for by a sponsor, and many firms are likely to prosper over the short haul, at least.

Attractions to buyer and seller

The evolution of software-for-sale is still continuing, but a clear pattern is developing. The business really started when a programmer decided he could sell to other users some specific software package he had developed. Such a case occurred with Computer Usage Co., which developed an IBM 360 COBOL compiler for Prudential Insurance Co., then with the Pru's permission offered it to others.

A more sophisticated approach came when the programming expert started specifying his resale rights in a customer's contract and then developed a more generalized product than the first customer needed. It solved the customer's problem, yet allowed the software firm to realize a profit with several resales. Usually, the original customer was charged 10% or so less than for an "exclusive" package.

In the next step, the one most prevalent at present, the original customer fills a role something like that of a theatrical angel on Broadway. The potential seller looks around and sees a gap, determines that he can fill it, then tries to find some assistance to offset his original costs. The original sponsor, in this

Table 1 - SOFTWARE PACKAGES OFFERED FOR SALE IN RECENT MONTHS

PROGRAM NAME	FIRM	USER MARKET	DESCRIPTION
Accufile	Anagram Corp.	IBM 7090/94	Storage and retrieval system for program specifications, flowcharts, coding, card decks, etc. Cost: $14,400 1st year, $7,200 2nd, none thereafter.
Autoflow	Applied Data Research, Inc.	IBM 7090/94, & 360 series; RCA Spectra 70's	Automatically prepares flow charts from COBOL, FORTRAN, or assembly language computer programs. Cost: $2,000 to $5,000.
Bankserv Credit Card System	Information Sciences Associates	IBM 1401/1460	Set of programs to support credit card systems normally used by banks. Cost: $10,000.
Bank Payroll System	Computer Sciences Corp.	IBM 360's in banks	Payroll program with which bank service centers can handle payrolls. Cost: $15,000.
ESI	Applied Data Research, Inc.	PDP-5, 8, 8/S	English-language conversational interpreter that replaces desk calculator, acts as time-shared terminal.
Exodus	Computer Sciences Corp.	IBM 1410/7010's going to 360	Translation system that converts most 1410/7010 Autocoder instructions to code suitable for Op.Sys./360. Cost: $9,000.
Expand	Computer Communications, Inc.	IBM 1130's	Set of programs that give 1130 commercial ability, such as sort and payroll Cost: $10,000.
40X	Computer Usage Development Corp.	IBM 360/40's	Program that gives more efficient emulation of 1401/1460 programs by handling printing in multi-programmed mode. Cost: $9,500 or $1,000 per month.
FMPS	Bonner & Moore Associates, Inc.	Computers with FORTRAN IV compiler	Highly modular mathematical programming system that can be adapted and modified by user to fit his own need.
Generalized Payroll Systems	Philip Hankins & Co., Inc.	GE 400's IBM 360's	Flexible payroll system designed for bank service centers but with possible other applications.
GIFT	Computer Fulfillment	IBM 360/30's and larger	General information file tester that will create a selected subfile on basis of parameters on customer-punched cards.
Linear Programming Systems	Haverly Systems, Inc.	IBM 1401/60's Honeywell 200's IBM 360's	A number of linear programming systems that require less hardware than the systems available from manufacturer. Cost: $3,000 to $10,000 or rented at $100 to $400 per month.
MACS	Informatics, Inc.	IBM 360's in banks	Handles media placement and accounting, lets advertising agencies make one-check payments each month.
MISSIL	Bonner & Moore Associates, Inc.	IBM 1800's & 1130's	A symbolic management information language upward compatible to IBM's Marble language on 360's.
SDS COBOL-65	Scientific Data Systems, Inc.	Sigma 7's	Unusually full business COBOL compiler; first software package offered for sale by a computer manufacturer. Cost: $20,000

case, doesn't control the specifications but then he only pays 50% or less of what the job would have otherwise cost.

Coming soon, as software firms develop the necessary capital and as there is demand for their products, is the situation in which a market need is determined, an investment is made in a general program to fill this need, and the package is then marketed. Bonner & Moore Associates, for example, decide on a package, then try to line up users as the software is being prepared. Usually, a spokesman says, such programs are underwritten before they are finished.

In the various steps of this process, the initial cost to the seller has risen from very little to almost 100% the total programming effort. At the same time, the cost to additional customers has dropped from some 20% of the original to say 5% or less. Thus, there are definite advantages to both buyer and seller, since both must be attracted if these transactions work. To summarize, the seller has:

- the ability to re-sell the same product, over and over, with practically no production costs;
- in some cases, the possibility of recouping at least part of the programming costs he would have had in any event;
- a growing market base for each product, since each compatible family of machines is used by an increasingly large number of customers;
- little possibility of competition from computer manufacturers, and therefore a more or less permanent market.

There are definite advantages, also, to the buyer of packaged software; it:

- can be tested for suitability before it is bought;
- avoids tedious and often highly sophisticated programming;
- generally gives higher performance than that supplied by the computer's manufacturer.

The manufacturers, indeed, are in a position worth examining in a little more detail. To them, software is frequently considered an expensive, frustrating, but necessary expense item in selling hardware. When software forces the user to pay more rent -- for example, in cases that require more memory than the basic machine configuration, or that call for additional peripherals -- it is happily supplied, since it generates additional revenue. Conversely, however, software that does not directly sell hardware, or even worse that eliminates the need for some expensive equipment, has little chance of being produced by the manufacturer. And software that only a few customers will ever use has little chance of being developed unless it is priced as part of a special systems project.

These are the facts, indeed, which open the door to the independents. For example, IBM didn't supply a linear programming package with its 1400 systems; this might have cut the market for its 7000 series. So operations research specialist Lawrence Haverly stepped in and filled the gap with an LP package. He now runs his own firm, Haverly Systems, Inc., and is also marketing similar packages for Honeywell's 200 series and for IBM's 360 machines.

Another example is similar. IBM didn't offer standard commercial software for the low-cost, scientifically oriented 1130 because it might have undercut the market for 360/20's and 30's. Therefore, Computer Communications, Inc. developed Expand, which allows the 1130 user to do some commercial processing on his machine, and

automatically opened a market for its $10,000 product. In both these cases, neither company really had to risk outright competition from the computer manufacturer . . .the market situation prevented it. These were safe "gaps" for the independent to attack and fill.

A slightly more dangerous gap is the one in which the software for a particular system does not provide some users with full utilization. It is always possible, in such cases, that the manufacturer will offer, free, software that will do the job. This, of course, would effectively kill the market for independent software sales.

Applied Data Research faced such a possibility when it developed Autoflow, a program that flow-charts and analyzes programs written in COBOL, FORTRAN, or assembly language. This product, out for two years now, is considered superior to any similar technique, but ADR had no way of knowing whether or not IBM would announce one equal or similar to it. This hasn't happened, so ADR now is breathing easier . . .and looking for more software opportunities.

Problems inherent in software-for-sale

Competition from computer manufacturers is not the only uncertainty in this market, however. For both buyer and seller alike, there are problems that have to be faced. The big problem for the seller, as has been pointed out, is security; both seller and user, however, face a number of problems that fall into three primary areas -- inflexibility, remoteness, and justification.

Inflexibility. Unlike most programs that the computer user is accustomed to working with, packaged software cannot usually be altered continuously, as is common with self-written programs. Indeed, the seller, in trying to protect his interests, naturally hesitates to provide the full documentation necessary for alteration. Thus, programs must be used as supplied and as a result only certain types of programs are suitable for independent sale.

Also, many computer families, although program compatible, have three or four different operating systems, with different label requirements. This can result in different operating characteristics within a family, and the seller is being forced to bring out special versions for each operating system. This is being done, however, so this problem for the user is vanishing. And these variations can act as a partial safeguard against mass unauthorized distribution of packaged programs.

Remoteness. Lack of on-site support can be a problem for the user, since even the larger software firms have only a few offices, and simply cannot supply the continuous attention offered by computer manufacturers. They have combatted most of this problem by eliminating manual console operations, providing very complete input checking, and writing clear operating instructions.

Maintenance, however, can be a problem. Perfect programs, perfect computers, and "typical" installations just don't exist, and often a program debugged in one installation will produce quite new bugs when run elsewhere, because the pattern of the programs used is somehow different. Hardware or operating system faults are often indistinguishable from program errors, and the software supplier sometimes finds himself having to put expensive time into cases where the computer system, rather than his program, has broken down. After all, when it's his word against that of the large manufacturer, and when he cannot offer full documentation, the

software supplier is the obvious scapegoat. In addition, of course, bugs do crop up in his own programs. These have to be traced and corrected. Then, of course, the same programs have to be checked at all installations where they're in use, and manuals have to be reprinted. At present, there is really no way to estimate the cost of this effort. One company president uses his private plane to check out customer problems; some companies put about 10% of their fees into a special maintenance fund, and hope. Indeed, it will probably take at least another year before valid estimates will be available for planning such costs.

One growing way of bypassing some of the maintenance problem may spell out another direction in which this "industry" may be headed. Some sellers franchise a sophisticated local computer user to sell their services and become partners in the profit. This tends to reduce maintenance calls to a minimum, and may well prove to be the best way for most software firms to handle this problem.

Justification. Few if any people in the computer industry really know how to evaluate and justify software. It is, therefore, difficult for the seller to price his wares and hard for the potential user to justify them. In most cases, management has traditionally considered software a no-cost item and cannot yet see why it should buy it. The problem, thus, is one of education; time and exposure may prove to be the best teacher in many cases.

Protection. Without a doubt, the vendor's major difficulty is protecting his proprietorship in an item that can be reproduced as easily as a computer program. This ease of reproduction, indeed, is one of his prime advantages in offering packaged software as a product.

It is usually impossible to detect whether a program has been copied, and legal sanctions are at best doubtful. Indeed, patenting of programs is being opposed by the Patent Office itself and as far as copyrighting is concerned, no case has yet been brought to court. This method of preventing unauthorized program use is anything but clear. At present, most purchasers honor the agreements under which programs are supplied, but there is no obvious way to insure that this will continue in the future.

One supplier, Anagram Corp., claims to have a system that will foil would-be copiers. If its tapes are copied, the company says, the copy will not work and the original will show signs of having been copied. There are no details; the company says only that it has tested the system carefully, and that "it works."

Generally, though, suppliers take more normal precautions, and hope. Card decks or tapes are tagged so that any unauthorized copies can be traced to the source. And legal possibilities are not ignored. Computer Sciences, for example, is quite emphatic in saying that it will take legal action against any buyer found breaking his contract. . . and doesn't think a programmer will risk his job in working with bootleg programs.

Actually, it would be possible to build a "black box" which would insure that only an authorized program ran on a particular computer. This, however, would have to be built and installed by the computer manufacturer. It seems unlikely, therefore, that this would be done unless the manufacturers were themselves selling software or unless the market were to become far bigger, so that such an attachment would be profitable for the manufacturer. (Either alternative puts the computer manufacturer squarely in the software market.) Thus, the software seller will probably be worried about protection for some time to come.

The potential

The companies introducing software-for-sale are quite varied. Some are consulting or programming firms well-established in the computer industry; others are very young and very small. To some this is a sideline, to others life-blood. The profit potential is there for all, but the eventual winners and the size of the market is difficult to predict.

Computer Sciences' development in the software-for-sale market is typical of the more routine entrance. It developed a program, called "Computax," for checking income tax returns prepared by accountants who subscribed to the system. In 1965, this service -- now handled by a partially owned subsidiary called Computax Corp. -- was being used by over 1000 accountants, but the program itself was not for sale or lease. Later, Computer Sciences developed a payroll program with which banks could provide customer services . . . and marketed it. Now, the company is selling its new "Exodus" program directly to IBM 1410/7010 users who are converting to IBM 360's. The company's primary business is still systems and software development.

One of the most recent entries into software sales is Computer Communications, only formed in November of 1966, partially by people from Control Data. Less than a month after the firm started into operation, it was marketing its "Expand" system that gives small commercial capabilities to the IBM 1130. The firm found a gap that IBM chose not to fill. It had plenty of potential customers, but IBM apparently chose to try to move them to more expensive System 360 equipment for commercial computation. The young company, however, is not going to rely on software sales for everything, as it also is selling remote display entry stations.

Most firms in the market followed paths similar to one of these, or found a spot in between. Indeed, the market is just opening up, and the next several months should see many more entries and more sophisticated methods of operation.

Already, in fact, services are springing up to support this budding business. For the software producers, companies are starting to offer marketing services, much like independent distributors, normally on a per-sale royalty basis. And for the potential software customer, several organizations are starting to publish catalogs of available programs and to list methods of procurement. They started in specific fields such as copyrighted programs (by Program Trade Center) and banking (by American Bankers Association). More services in both these areas are likely to start up before long.

These type services, of course, depend entirely on the success or failure of the software-for-sale market. And this market is full of uncertainties. There is a definite, long-term need for certain types of software: Specialized languages and specific application packages are more and more in demand, but are likely not to be furnished by the manufacturers, unless software contributes directly to sales.

These special packages take lots of technical talent, a scarce commodity. Software firms, in preparing specialized packages for customer sale, can muster this talent together for six months or a year. The ability to prepare good, salable software, however, is still an art. . . not a science. Until, and if this situation changes, the outlook for prosperity in software-for-sale firms will be based on ability to attract and hold the top software "artists" and ability to define carefully the needs of the marketplace.

[Information on software-for-sale continues on next page]

SOME SOFTWARE-FOR-SALE FIRMS ACTIVE IN RECENT DEVELOPMENTS

Below are thumbnail sketches of some of the software-for-sale firms that have recently marketed proprietary software packages. Included in each listing are some of the programs offered for sale or lease (see Table 1). Many new companies are now entering the software-for-sale business each month. This list, therefore, is only representative of the type of companies participating in this market.

Applied Data Research, Inc. (Autoflow, ESI). This Princeton, N. J. company has offices in Los Angeles and Arlington, Va. It is listed Over-the-Counter, with almost 60% of the stock owned by officers and directors of the company. Sales in 1965 were just under $1 million; figures for 1966 are not yet announced but should be quite a bit higher. Founded as a consulting firm in 1959, the corporation tends to seek the unusual in its activities and generally makes a financial success of them. ADR's Proprietary Software Division was formed specifically to sell or lease software systems to computer users, and currently the group has other software packages under development.

Bonner & Moore Associates, Inc. (MISSIL, FMPS). A private consulting firm headquartered in Houston, B&M has a subsidiary in West Germany and holds a majority interest in Profimatics, a West Coast consulting firm. The company, which employs about 60 professionals, prefers to sell software packages, although it will negotiate hourly use charges for smaller organizations. Prices are in the $5,000 to $50,000 range, with most packages selling between $10,000 and $30,000. Bonner & Moore has recently entered the field of technical documentation, preparing manuals both for its own programs and for those of outside customers.

Computer Communications, Inc. (Expand). This new company, formed in November of 1966, has no sales history. Key officials of the corporation came from Control Data Corp. It intends to specialize in both software and hardware development, and in only a few months of operation has introduced a product in each field (see text, Page 7). Emphasis will be in programs and equipment for time sharing.

Computer Sciences Corp. (Bank Payroll System, Exodus). Founded in 1959, this company, which is listed on the American Stock Exchange, has undergone considerable growth. Sales for six months ending Sept. 1966 were $17 million, and should approach $40 million for the fiscal year ending this month, up from only $4 million in 1964. It has made such acquisitions as Communications Systems and System Sciences from ITT, as well as Potter Aeronautical. It also owns slightly less than half the stock in Computax Corp. which markets a CSC developed system for computer preparation of tax returns. Headquartered in El Segundo, Calif., the company has offices in seven major U.S. metropolitan areas.

It has recently formed a Systems Programming Div. to emphasize its software business.

Computer Usage Co., Inc. (40X). The oldest independent computer service organization, this company was founded in 1955. It is headquartered in Mt. Kisco, N. Y., and its stock is traded Over-the-Counter. Sales for fiscal year ending Sept. 1966 were almost $9 million, up from $6 million for the previous year. It has the reputation of being financially conservative -- an unusual characteristic for the computer industry. The company is not neglecting the possibilities of software-for-sale, but appears to be concentrating on system software produced under contract with the computer manufacturer and on business applications, such as personalized letter services, which are marketed. It maintains ten branch offices in the metropolitan U. S. and a staff of over 300 specialists.

Philip Hankins & Company, Inc. (Generalized Payroll System). Established in 1959, this private firm does computer consulting and operates a service center. Total employment is about 75. The software system it offers for sale was prepared specifically for Marine Midland Trust, but later put on the market by the firm. As of now, software-for-sale fits into the firm's future plans, but is not current a big effort.

Haverly Systems, Inc. (Linear Programming Systems). This private firm, headquartered in Denville, N. J., primarily specializes in operations research and linear programming studies. With the spreading use of linear programming, this firm's low-cost systems seem to have good prospects.

Informatics, Inc. (Media Account Control System -- MACS). This Sherman Oaks, Calif. company, founded in 1963, is a subsidiary of Data Products Corp., a manufacturer of peripheral computer equipment. About 10% of Informatics' stock is publicly held and traded Over-the-Counter (as is that of Data Products). Sales for the fiscal year about to end should exceed $6 million, up from $4.5 million for the previous year. The company specializes in design, analysis, programming, and implementation of on-line computer systems. MACS is its first proprietary program to become operational, but it is expanding its activities in new salable software products for specific applications.

Information Sciences Associates (Bankserv Credit Card System). Headquartered in Cherry Hill, N. J., this private consulting firm was founded four years ago. It specializes in planning and implementing new services for banks, and says its present product is the first of a series of ready-to-use systems. A second system will be announced shortly.

E|D|P industry report

AND MARKET REVIEW / FORMERLY EIDIP INDUSTRY AND MARKET REPORT
• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH
THE ELECTRONIC DATA PROCESSING INDUSTRY

THE GRAY SHEET JULY 28,1967 VOL.3,NO.3 P.J. McGOVERN, EDITOR

DATA SYSTEMS, INC. SUES A ST. PAUL BANK FOR $100,000 AS ADAPSO LAUNCHES ATTACK ON RIGHT OF BANKS TO OFFER DATA PROCESSING SERVICES

With each passing week it looks more and more as if a large part of the computer's future may well be decided by the courts. As has been pointed out, the revived ENIAC patent dispute (EDP/IR, June 28, 1967) can have major implications for hardware manufacturers. Now, the future of computer service organizations -- and the role that banks are allowed to play in the total picture -- may also be decided by the courts.

ADAPSO (the Association of Data Processing Service Organizations, which represents almost half the service bureau industry) has joined with Data Systems, Inc., a service bureau in Minneapolis, to sue both the Comptroller of the Currency and the American National Bank and Trust Co., a St. Paul, Minn. bank. ADAPSO says that a bank's selling data processing service to its customers is "non-banking business, not within the statutory grant of powers, and unlawful."

The complaint, filed in the Minnesota U.S. District Court, demands that the Comptroller be enjoined from making any rule that gives national banks "the power to engage in the marketing or performance of data processing service business for their customers or for the general business community." In addition, Data Systems is asking damages of not less than $100,000 from American National which, in performing data processing services for certain Minneapolis area organizations, has caused "substantial and irreparable harm . . . by depriving [Data Systems and other members of ADAPSO] of customers for whom data processing services would be rendered and from whom compensation would be received."

High stakes

The case is important . . . not simply in itself but also in its implications for banks and independent service bureaus. DP business is of growing importance to banks, if for no other reason than that it is a marketing tool with which to lure corporate business for more traditional -- and more profitable -- banking services such as demand accounting, trust fund management, and the like. And for service bureaus, which do several hundred million dollars of business a year, the decision will be amplified countless times.

Also, banks today -- at least the aggressive ones -- are seriously studying the implications of the computer on the entire system of money and credit transfer. Several times a year, now, there are conferences that discuss the "checkless, cashless economy." Naturally, banks stand to play a major role as electronic credit transfer systems are set up. Equally important is the role of the service bureau.

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As time sharing becomes widespread and the accepted way to use a computer in many applications, the role of the service bureau could become more dominant than that of the computer manufacturer. So the stakes, potentially, are quite high.

Question of interpretation

In the present case, which could be tried and appealed within a year, there are both philosophical and very concrete demands. This is why the case has been brought by both an association and one of its members against an individual bank as well as the Comptroller of the Currency, who has the authority to interpret the National Banking Act and its implications for data processing.

A national bank's authority to offer DP services comes from a section of the Act which states that a bank can exercise "all such incidental powers as shall be necessary to carry on the business of banking." This, according to a ruling by the Comptroller last year, means that a bank with DP equipment "may solicit computer business and offer essentially clerical services to its customers, such as bookkeeping or billing services, which do not demand a high degree of discretion, as incidental to the business of banking."

The Comptroller's interpretation of the National Banking Act, says ADAPSO, should be examined by the court; the association claims that service operations by banks are "unlawful." Under the Comptroller's rulings, the voice for over 350 service bureaus says, the marketing of DP services by banks has been growing rapidly and will grow even more rapidly. It is well known that many banks offer DP service at or below cost as sort of a "loss leader." The complaint is specific about the potential power of banks: Because of the enormous financial power of national banks and their banking relationships with existing and potential customers for such services, the marketing of such services by national banks threatens ultimately to exclude all ADAPSO members and other independent service organizations from all or a very substantial part of the market for the sale of data processing services."

Such services, plaintiff Data Systems says, are "illegal, not part of or incidental to the business of banking, and beyond the powers granted to national banks under the National Banking Act." It lists two particular cases:

- In December of 1966, the complaint says, Data Systems entered into negotiations with the State Capitol Credit Union of St. Paul to provide data processing services. In February of 1967, it continues, American National entered into an agreement with the credit union and agreed to perform "certain data processing services."

- In April of 1967, the complaint continues, American National signed an agreement with Carlen Industries of Minneapolis to perform data processing services, and since that time has been performing such services. Prior to this, Data Systems says, it had entered into negotiations with Carlen to provide data processing services.

In each of these cases, the complaint says, "Data Systems has been deprived of the right and opportunity to perform said services and to be compensated therefor."

Implications

The crux of the matter -- the essential point which the court has to decide -- appears to be the interpretation of "incidental to the business of banking." The

view of the independent service bureaus is that sophisticated DP services are not incidental.

Banks, on the other hand, believe they have the right to determine banking services, and that data processing in many instances is a banking service. And with the banks at present trying to reevaluate their role in a society that is more and more dependent on computer-related services, the case could evolve into a broad discussion about the future of the role of electronics in the financial field. In any event, the case is well worth watching.

NEW YOUR STOCK EXCHANGE MOVES COMPUTER OPERATIONS TO NEW JERSEY; PLANS VAST NEW SYSTEM BUILT AROUND THREE IBM 360/65'S

The New York Stock Exchange is moving its computers out of Manhattan, no matter what the fate of the stock transfer tax proposed by Mayor Lindsay. In April of next year the NYSE's data processing center starts packing its bags for New Jersey, and it has already ordered a new batch of equipment worth at least $15 million, EDP/IR estimates. This will form "one of the largest and most reliable computer complexes in the United States," according to Keith Funston, Exchange president.

At present the Exchange is using two IBM 360/50s, two 360/30s, two 7010s, plus two 7750s, which control data transfer between the 7010s and a communications network. The Market Data System they form is approaching the capacity of this equipment, however, and will be replaced in the fall of 1969 by three 360/65s and a 360/50 all hooked to a very large memory device. The new system will be able to handle about twice the 1676 securities presently listed on the Exchange.

With the interlocking 360s, an Exchange spokesman says, the system will have necessary backup and can do proper stock ticker checking to "make sure that it stays alive." In addition, the new system -- being developed by IBM's Federal Systems Div. and which the Exchange says will rent for a little more than the present one -- will be able to meet the growing demands for other services: clearing and settlement, central certificate service, central computer accounting, and odd-lot switching. Special engineering will allow further expansion "literally with the plug-in of additional computer capacity."

NYSE has signed a seven-year lease for a Paramus, N.J. building originally used to house part of ITT's data center. It contains 55,000 square feet and is large enough to house both the old and new systems.

The Exchange still plans to retain property recently purchased in Oradell, N.J., three miles from the Paramus site, as a possible future permanent home for its Electronics Systems Center (or perhaps for a new Exchange headquarters building). To have moved to that site at this time would have required a minimum of 21 months for construction of a special-purpose building plus many more months for installation and testing of the computers. "Any slippage in the building program plans could have aggrevated the situation to the danger point," Funston pointed out.

An Exchange spokesman declined to estimate when the first new IBM computer might be installed in Paramus, saying, "we never expect an original schedule to be met." He did, however, state that it was "absolutely necessary that the new system begin functioning by the time the capacity of the present equipment is reached."

He adds that "if the computer bombs out we can always go back to manual operation, unlike Amex." But clearly IBM would prefer to perform well when in full view of the financial community.

E|D|P industry report
AND MARKET REVIEW
• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 11,1968 • VOL.3,NO.23 P.J.McGOVERN,EDITOR

DATA COMMUNICATIONS TERMINALS NO LONGER MUST DEPEND ON "DATA PHONES" AS FCC RULES THAT MODEM RESTRICTION BY AT&T IS "UNREASONABLE"

We hold that the tariff is unreasonable in that it prohibits the use of interconnecting devices which do not adversely affect the telephone system. . . No one entity need provide all interconnection equipment for our telephone system any more than a single source is needed to supply the parts for a space probe. . . we find that Tariff FCC No. 263, paragraphs 2.6.1 and 2.6.9 are, and have since their inception been, unreasonable, unlawful and unreasonably discriminatory . . .

With these words -- some of which have overtones of the Declaration of Independence -- the Federal Communications Commission settled the Carterfone case (EDP/IR Nov.19,1967) and freed users of data communications equipment from being forced to use modems or data sets supplied by AT&T.

In the order effective July 29, 1968, the FCC made a much more sweeping decision than was necessary in the case being considered. The specific question in the case was whether an acoustic coupler made by Carter Electronics Corp. could be used to connect a two-way mobile radio system with the telephone system. Instead, the FCC took a much broader look and concluded that "the provisions prohibiting the use of customer-provided interconnecting devices should . . . be stricken."

This means there will be a general loosening in restrictions that can be imposed by telephone companies, although the FCC certainly made provisions for the setting up of "reasonable standards" to be met by interconnection devices." Of perhaps more importance, however, is the implication of this ruling on the eventual outcome of the FCC's inquiry into the interrelationships between computers and communications (EDP/IR Nov.15,1966).

It is certainly too early to predict the outcome of this inquiry. Indeed, the FCC has just allotted $500,000 for a study, by Stanford Research Institute, that will explore the interrelationships, interpret the mountainous pile of briefs already submitted for the inquiry (EDP/IR Apr.25,1968), and present recommendations. But the wrist-slapping of AT&T would at least suggest that the FCC, as it has said all along, is going to give a fair hearing to the voices from the computer industry. Mother Bell, apparently, has been warned that it can't always have its way and that other companies might be able to contribute improvements to the telephone system in this country.

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The FCC decision

The FCC, in handing down its decision, said that it realized the responsibility of telephone companies to establish, operate, and improve the telephone system. "The telephone companies [are] free to make improvements to the telephone system and [can] reflect any such improvements in reasonable revised standards for non-telephone-company-provided devices used in connection with the system. Manufacturers and sellers of such devices would then have the responsibility of offering for sale or use only such equipment as would be in compliance with such revised standards.

"An owner or user of a device which failed to meet reasonable revised standards for such devices, would either have to have the device rebuilt to comply with the revised standards or discontinue its use. Such is the risk inherent in the private ownership of any equipment to be used in connection with the telephone system."

This parallels the arguments presented in the past by independent suppliers, and supported by EDP/IR. Certainly, no breakdown in our communications system can be permitted because a shoddy manufacturer failed to meet appropriate standards. But, as we have said, "standards should be devised so that responsible manufacturers can provide equipment that can be attached to the communications circuits."

Outlook for competition

Establishing such standards will certainly assist manufacturers who build data communications terminals as well as individual modem (modulation/demodulation) equipment. Equipment used in data communications, unlike some used in the voice communications system, is under very close scrutiny and is regularly maintained. It has long been a known fact that manufacturers of terminals could build an efficient modem into their equipment and supply it for far less than the telephone company charges for a data set. Now, with a set of standards, this will apparently be possible.

One of the major companies to be affected by this decision is General Electric, which announced last fall (EDP/IR Nov.19,1967) a full line of "Bell-compatible" data transmission equipment. GE had set the independent telephone companies and private telephone networks as its major markets, but admitted privately that it certainly would like to connect its equipment to Bell System lines. Now, it has a vastly increased marketplace.

In addition, IBM, other terminal manufacturers, and the independent companies which can supply modems for terminals should be favorably affected by the decision. The exact effects are not known, and won't be until AT&T files new tariffs and announces standards for the attachment of "foreign" devices to the telephone system.

At present, AT&T is also reviewing the FCC's action. It has stated that it wants to be as responsive as possible to evolving communications needs. Indeed, the giant company has gone to very great effort and expense in trying to anticipate the nation's needs for data communications.

All in all, EDP/IR applauds the action by the Federal Communications Commission and looks forward to a fair set of standards that will protect the country's

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complex communications network and that will give any responsible manufacturer the ability to build products for the data communications market. We project that the market for data communications equipment will exceed $1 billion in the U.S. by 1972. Competition in manufacturing equipment for this market can do nothing but benefit the growing number of people who rely on data communications.

FIRST PATENT ON SOFTWARE, AWARDED TO APPLIED DATA RESEARCH, REOPENS INDUSTRY-WIDE DISCUSSION ON PROBLEMS OF PROGRAM PROTECTION

When the U.S. Patent Office issued Patent No. 3,380,029 recently to Martin A. Goetz, a vice president of Applied Data Research, Inc., observers in the computer industry were stunned: To all intents and purposes, it looked as if a computer program had been patented . . . an action predicted to be highly unlikely (EDP/IR Nov.19,1967) and one that well can be considered a reversal of policy.

With legislation pending in Congress as to whether to limit or allow the copyright or patenting of computer programs, and with a constant dialog being carried out throughout the industry, this patent refocuses attention on the entire problem of software protection.

The Goetz patent involves a process for performing an oscillating sort using four magnetic tape drives that read in a forward direction only (emphasis ours). Virtually all sorting routines in common use are based on different principles, so this particular patent's importance is primarily academic. But if its validity is upheld in court tests (the Patent Office emphasizes that "we issue invalid patents every day"), the Goetz patent will have important implications and will figure strongly in several areas that are under various stages of discussion:

- Proposed patent reform legislation, now under study by Congressional committee, at one time contained a provision (Section 106) that would eliminate the patenting of computer programs. The final bill will certainly be influenced by industry's reaction to the software patent.

- Enforcement of future patent infringements is considered a serious problem. Interestingly, a second ADR patent, now pending, is expected to be a valuable tool in assisting enforcement of future program patents.

- If settlements are made for infringement of this or future software patents, they would help define a process for determination of the dollar value of a program, and thus remove a major obstacle in the drive to separate the pricing of hardware and software.

The question of validity

The primary value of the Goetz patent, according to the inventor, is "the fact that we have a patent on what is described as a program." In addition, the company has a patent pending on Autoflow, its automatic flow charting system, and thinks the current patent is a valuable precedent. This may be. But the Patent Office doesn't officially admit that it has patented a program.

"We have not changed our guidelines and we do not think that a program is patentable," a Patent commissioner says. The Office's solicitor says that he noticed the movement of the tapes described in one portion of the patent, and says he feels this could easily be interpreted as being a "process" and as such patentable without any problems.

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There is definitely a question as to whether the Goetz, or any software patent, will be held to be valid. To be patentable, an invention must involve a new process or new mechanical system, not merely just a clever set of machine instructions. Even Goetz expects to see only a small number of programs patented. For one thing, programming systems and techniques have been under active development since the early part of the '50s, although there have been few applications for patent or copyright protection.

Under current patent law, a patent can be invalidated if it is shown that the process granted a patent had been reduced to practice before the date which the patent holder claims as the time of discovery. With little documentation available, it would be easy to argue but hard to prove that prior discovery had been made. Even if a system of searching was available, however, the Patent Office says that "reliable searches would not be feasible or economic because of the tremendous volume of prior art being generated. Without this search, the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent."

Program protection

Assuming the Goetz or some other software patent were held to be valid, the detection of infringement will be quite difficult. For one thing, the vast amount of software is written by computer users for internal applications, and ADR, or another patent owner, would not have the opportunity to examine such programs. Also, with the source documentation for many programs sketchy and the computer room version in machine language, proof of infringement would be difficult, and getting this point across in the average court would be quite a task for even the most skilled lawyer.

This doesn't seem to bother ADR too much. It is worried about one of its competitors, or a computer manufacturer, copying a program and offering it to customers. In such cases, ADR says, its Autoflow program could easily show whether the same principles were being used in the challenged program. The fact that a program is patented, it feels, would effectively discourage copying by competitors.

And -- ADR points out -- it is principles and techniques, not instructions, that are covered by a patent. Because of the importance of being able to analyze programs, the company obviously hopes to receive a patent on its Autoflow program. Also, with over 130 Autoflow packages now in use, ADR would certainly appreciate the competitive advantage that a patent would afford.

Proof of infringement by a computer manufacturer or a software firm -- and any subsequent settlement -- would be of high interest to the computer industry. In the case of a manufacturer, the patent holder would have a right to claim a royalty payment on all programs using the patented technique -- even though they were supplied free as software support to the computer user. This would require determining the dollar value of a program and therefore set a valuable precedent in future efforts at pricing of computer programs on a separate basis.

What's the answer?

Until the courts decide on the validity of the Goetz or future patents, and until the patent reform legislation becomes law, there will be no definite answer to the question of program protection and the dialog can be expected to continue throughout the industry.

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An excellent analysis of the many legal aspects of the problem is contained as a Note in the May Harvard Law Review. In the article, the editors discuss the pros and cons of copyright, patent, and trade secret protection for programs. They seem to feel that copyright and patent protection are incorrect:

> *Since patent's protection is broader than copyright's, it would give greater encouragement to oligopoly within the computer industry and might raise new entry barriers to the currently open field of software production. Manufacturing companies would receive a significant competitive advantage due to their larger research and litigious capabilities, and their complex and expensive programs might have a better chance of meeting patent's stiff innovational test than would the simpler proprietary programs. Manufacturing companies might be able to tie up enough techniques that the smaller software firms would find it difficult to survive. Finally, the traditional evils of monopoly -- complacency and high prices -- could stifle future development; companies might concentrate more on detecting infringers and protecting their patents than on investing in new and more efficient programs.*

Following this, the editors argue for protection under trade secret law:

> *This form of common law protection provides a desirable incentive to innovation by protecting competitive advantages derived from valuable processes and products, yet its boundaries are suitably circumscribed to limit the power of a trade secret proprietor to exclude competition.*

The summary of the article, "Computer Programs and Proposed Revisions of the Patent and Copyright Laws," is a strong plea to keep computer programs outside copyright or patent protection:

> *It seems that the technological and policy problems posed by computers were not carefully considered by the drafters of the Copyright Revision Bill. Since the industry may change rapidly, rigidifying the law at this time would be unwise, especially since copyright law is infrequently revised and, once a provision is enacted, interest groups fight fiercely to retain it. A serious consideration of the limited effect of copyright on the industry's needs and its potential dangers should lead Congress to enact explicitly that computer programs are outside the scope of copyright. Similarly, Congress should keep intact the present section in the Patent Reform Bill which explicitly makes programs unpatentable* [Section 106].

This section of the bill, at present, has been removed. And if the Goetz patent is held to be valid, the section would be unnecessary unless it could be made retroactive; even then there would be questions. At this time, all the Patent Office will say is that it is aware of the overall problem and would be delighted to have comments or suggestions from anyone or any organization on the entire matter.

There certainly is need for clarification. Already there have been reports of program thefts in Britain and Texas; in the near future, it's easy to speculate, we'll hear of sophisticated thefts involving the breaking of passwords on time-sharing systems. These problems would not be solved by patent protection, of course, and for the time being -- since it reflects the current situation -- it probably would pay program owners to study the laws concerning trade secrets.

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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 28, 1969 • VOL.4,NO.11 P.J.McGOVERN,EDITOR

It happened!

JUSTICE FILES ITS ANTITRUST SUIT AGAINST IBM

It was expected in some quarters . . . held to be a remote possibility in others. It is considered, variously, as a slap at the free enterprise system . . . an overdue action . . . and perhaps the best thing that could happen to IBM in the light of legal action already taken (EDP/IR Dec.23,1968 & Jan.9,1969). In any event, it has happened:

The Justice Department has filed its antitrust against IBM. And IBM, obviously prepared, countered quickly:

- Within an hour or two of the filing -- late on the last Friday of the outgoing Johnson administration -- IBM issued a press release which said it will "defend itself forcefully against this action, which it believes is unwarranted and without foundation."

- In a letter to stockholders dated Jan. 17, IBM Chairman Thomas J. Watson, Jr. repeated much of what was said in the press release (quoted later in this issue) and assured stockholders "the highly competitive data processing industry will remain a growing and dynamic one, and that the fundamental outlook for IBM's future continues to be very good."

- In double-page, center-fold spreads in the New York Times, the Wall Street Journal, and major metropolitan dailies, IBM on Wednesday, Jan. 22 asked: "Has IBM spoiled the computer business for others? Let's look at the record . . ." The text which followed was a well-thought-out, convincing explanation of IBM's role and posture in the computer industry.

In its complaint, Justice is asking, as a minimum, for separate pricing of "(a) general purpose digital computers; (b) peripheral equipment; (c) computer software; and (d) other customer support which it manufactures or offers to its customers." Also, Justice asked the court for "provisions barring IBM from setting prices that fail to reflect reasonable returns and from granting special allowances that unreasonably inhibit the entry or growth of competitors." In addition, of course, Justice asked the court to declare that IBM "has attempted to, and did monopolize . . . the general purpose digital computer industry" and, therefore, "to order any divorcement, divestiture or reorganization of IBM deemed necessary to dissipate the effects of the allegedly illegal activities and to restore competitive conditions."

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Some of these requests, it is sure, will be effected voluntarily or legally; and any change in IBM's way of doing business will have an effect on the computer industry. In this issue, therefore, EDP/IR presents a rundown on the Justice Dept. complaint; the statement issued almost immediately by IBM; and an examination of the situation as it now appears to stand.

The Justice Department Complaint

Unlike the complaints filed recently by Control Data and Data Processing Financial & General, which were brought under various sections of both the Sherman and the Clayton Acts (EDP/IR, Jan.9,1969), the complaint filed by the Justice Dept. in the Southern District of New York is instituted only, "to prevent and restrain the continuing violation of" Section 2 of the Sherman Act. This antitrust law involves "every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize . . ." It is used less often than other antitrust legislation.

In its complaint, Justice describes the defendant, IBM, defines terms in a very general manner, outlines previous antitrust action against IBM, then, about half way through its 12 pages, describes IBM's alleged offenses, the effects of these, and what is requested from the court. We quote from this stage to the end of the complaint:

OFFENSES

19. Beginning in or about 1961 and continuing up to and including the date of the filing of this complaint, the defendant has attempted to monopolize and has monopolized the aforesaid interstate trade and commerce in general purpose digital computers in violation of Section 2 of the Sherman Act (15 U.S.C. §2). Said offenses are continuing and will continue unless the relief hereinafter prayed for is granted.

20. Pursuant to and in furtherance of the aforesaid attempt to monopolize and the monopolization, the defendant has pursued a manufacturing and marketing policy that has prevented competing manufacturers of general purpose digital computers from having an adequate opportunity effectively to compete for business in the general purpose digital computer market, and has done, among other acts, the following:

(a) Maintained a pricing policy whereby it quotes a single price for hardware, software and related support and, thereunder, (i) discriminated among customers by providing certain customers with extensive software and related support in a manner that unreasonably inhibited the entry or growth of competitors; and (ii) limited the development and scope of activities of an independent software and computer support industry as a result of which the ability of its competitors to compete effectively was unreasonably impaired;

(b) Used its accumulated software and related support to preclude its competitors from effectively competing for various customer accounts;

(c) Restrained and attempted to restrain competitors from entering or remaining in the general purpose digital computer market by introducing selected computers, with unusually low profit expectations, in those segments of the market where competitors had or appeared likely to have

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unusual competitive success, and by announcing future production of new models for such markets when it knew that it was unlikely to be able to complete production within the announced time; and

(d) Dominated the educational market for general purpose digital computers, which was of unusual importance to the growth of competitors both by reason of this market's substantiality and by reason of its ultimate impact on the purchasing decisions in the commercial market, by granting exceptional discriminatory allowances in favor of universities and other educational institutions.

EFFECTS

21. The aforesaid offenses have had, among other things, the following effects:

(a) The defendant has monopolized and continues to monopolize the general purpose digital computer market in the United States;

(b) Actual and potential competition in the manufacture and marketing of general purpose digital computers in the United States has been restrained; and

(c) Competitors of IBM have been improperly deprived of the opportunity to earn competitive profits on their general purpose digital computers and actual and potential competitors have been discouraged from entering or continuing in the business of manufacturing and marketing general purpose digital computers.

PRAYER

WHEREFORE, the plaintiff prays:

1. That the Court adjudge and decree that the defendant has attempted to, and did monopolize interstate trade and commerce in the general purpose digital computer industry in violation of Section 2 of the Sherman Act.

2. That the defendant and all persons, firms, and corporations acting in its behalf or under its direction or control be permanently enjoined from engaging in, carrying out, or renewing any contracts, agreements, practices, or understandings, or claiming any rights thereunder, having the purpose or effect of continuing, reviving, or renewing the aforesaid violation of the Sherman Act, or any contract, agreement, combination or conspiracy having like or similar purpose or effect.

3. That the defendant hereafter be required to price separately and to offer to sell or lease separately, and to sell or lease separately to any applicant upon such terms and conditions as the Court may direct (a) general purpose digital computers; (b) peripheral equipment; (c) computer software; and (d) other customer support which it manufactures or offers to its customers.

4. That the defendant hereinafter be required to refrain from the use of special allowances, buy-backs of computer time, or research grants, in the sale or lease of any and all general purpose digital computers, periph-

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eral equipment, computer software and other customer support equipment or services which it manufactures or offers to any of its customers, where the effect of such practices may be unreasonably to inhibit the entry or growth of competitors.

5. That the defendant hereinafter be required to refrain from entering into the production of computer hardware which is not likely to result in returns reasonably related to returns from other computer hardware products sold or leased, or which could be sold or leased, by the defendant.

6. That the defendant hereinafter be required to refrain from the announcement of the development or production of any planned computer hardware or software until such product has been subjected to normal testing.

7. That the plaintiff have such relief by way of divorcement, divestiture and reorganization with respect to the business and properties of the defendant as the Court may consider necessary or appropriate to dissipate the effects of the defendant's unlawful activities as hereinbefore alleged in this complaint, and to restore competitive conditions to the general purpose digital computer industry.

8. That the plaintiff have such other and further relief as the nature of the case may require and the Court may deem proper in the premises.

9. That the plaintiff recover the costs of this suit.

The IBM reply

Within an hour or so after Justice filed the complaint, IBM was ready with its answer. It was given by telephone to publications about to close, and was mailed across the board on Jan. 17, the Friday of the filing. Here is exactly what it said:

ARMONK, N.Y., Jan. 17 . . . International Business Machines Corporation said today it will defend itself forcefully against charges by the Department of Justice that it is monopolizing the data processing industry. IBM said it believes the government's action to be unwarranted and without foundation.

The company's statement said:

This lawsuit is the outgrowth of the previously reported discussions which have been going on for nearly three years between the Department of Justice and various companies in the data processing industry. IBM has cooperated fully in this review.

One of the key issues in these discussions has been whether there is sufficient competition in the data processing industry or whether IBM has such monopolistic power that fully effective competition does not exist.

Evidence of the open and strongly competitive nature of the computer business is abundant. Virtually nonexistent 20 years ago, it has grown into a multi-billion-dollar industry that has attracted more than 60 manufacturers of computer systems and some 4,000 companies dealing in related equipment, support, and services.

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New companies as well as major and well-established ones have been freely and effectively entering the industry, whether they have a competence in electronics, a background in business machines, or simply a technical innovation which can be developed into a business. Technological advances have come at a very rapid rate, and from all corners -- not just from IBM.

Despite this evidence of strong and increasing competition, the Government has decided to bring this suit.

IBM will defend itself forcefully against this action, which it believes is unwarranted and without foundation. The company believes, furthermore, that the highly competitive data processing industry will remain a growing and dynamic one.

And IBM continued spreading its story in newspaper advertisements. Quickly after the Justice suit was filed, IBM ran double-truck spreads -- estimated to have cost IBM, for space alone, well over $500,000 -- in virtually all of the country's standard-sized metropolitan dailies. In the all-print ad, IBM admits that loose talk of its dominant role in the computer industry would be dangerous -- "if the charges were true." It then gives its side . . . and asks the reader to look at the "facts," including a classical discussion of monopoly:

Some hang their charges of "monopoly power" on what they call IBM's excessive share of the market. That market share is substantial; it is the product of IBM's emphasis on excellence in all the years it has been in the business. It is the product of customer response to the investments we have made, and to the quality of our people, our products, our service.

But monopoly power is not a numbers game based merely on what has occurred in a market in the past. Rather, common characteristics of monopoly, as the economists define it, exist when newcomers are unable to break into an industry, when competition is suppressed, when innovation is throttled, when there is no price competition, when the interests of the customer are subordinated to those who monopolize the industry.

These are hardly the characteristics of the computer industry that is alleged to be a "monopoly" of IBM. But let the facts of the industry speak for themselves. They tell it better than we could.

IBM continued, then, to tell it well. The 1500-or-so-word text was lucid and well organized. It was definitely written to counter the charges of monopoly stemming from some of the recent lawsuits, although many of its overtones reflect the continuing series of advertisements in which IBM talks to the public and to the general business community about the important role that the computer business plays in the economy and about the helpful role that IBM plays within the computer industry (EDP/IR,June 14,1968).

Although IBM won't say whether or not the ad was prepared prior to the Justice Department's filing of its complaint, there is every likelihood that it was in the works, at least. Just the physical job of seeting the ad in type, making mats, reserving double-page spreads, and delivering the mats to 100-plus newspapers requires an intensive amount of effort and coordination . . . and a frenzied weekend: The complaint was filed late one Friday, the ad broke the next Wednesday.

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Was the ad a one-shot affair? IBM won't say, but advertising executives at other computer companies point out the importance of repeat exposure . . . especially when selling a concept. If IBM's goal is to inform the public and create good will among customers and stockholders, then it is almost a certainty that similar ads will appear with regularity. And this must be at least one reason for the ad. In any event, the ad shows the importance of the situation, at least to IBM, and illustrates that IBM indeed intends to defend itself forcefully.

Separate pricing

It seems quite apparent, now -- in the light of everything that has happened in the last month or so -- that some form of "unbundling," or separate pricing, will be instituted by IBM. IBM announced its intention in this direction, before the first suit had been filed, and summarized its position in its reply to the complaint filed by DPF&G:

> Most recently, on December 6, 1968, IBM announced that by no later than July 1, 1969, it expects to make changes in the way it charges for and supports its data processing equipment, which is apparently DPF&G's current principal complaint. The changes are aimed at determining what support services should be separately offered and priced to better meet the future requirements of all users of IBM equipment.

EDP/IR considered this prospect quite carefully last year (EDP/IR,May 15,1968), and has rethought the situation seriously again following the bringing of the matter to the courts. We see no need to change the position and analysis stated in the referenced issue:

> Proponents of separate pricing admit that it will take IBM action to make it work, and yet such action might simultaneously make competitive survival more difficult for other computer manufacturers, force independent software suppliers to offer more service at reduced profit margina, and put many computer users in a position of having to pay more for less. [Emphasis added.]

In addition, as we pointed out in the same newsletter, separate pricing will work to the advantage of IBM . . . its effect on other portions of the computer industry are not known.

Thus, separate pricing is going to be here to one degree or another. Yet, some companies are beginning to see the total picture. One software company has already "urged" that Justice "proceed with deliberate caution in its antitrust action against IBM to avoid disrupting the stability of the 'relatively young and still highly volative data processing industry.'" And many computer manufacturers admit, privately, that separate pricing might work to their disadvantage unless IBM's software operation continued to hold its price umbrella.

We must reaffirm the position taken in the issue mentioned above, in which we analyzed separate pricing: "[Separate pricing] would definitely be a disadvantage to most manufacturers; and, over the long term, it would probably hurt all the above [independent software suppliers and many users] and work to the advantage of only one organization -- IBM." This may not be completely clear at first glance, but we are convinced that the computer industry is unique . . . operating at a level much higher than would be possible were it not for the pattern and policies established by the dominant company in the industry.

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Third-party computer leasing

This situation shows up nowhere more clearly than it does with the companies which essentially buy computers from IBM and lease them to users at a rate lower than IBM's rental charges . . . assuming, perhaps correctly, that the lifetime of today's computer is more than the four years which IBM chooses to use as its write-off period.

In following this business practice, the leasing companies, really, are making a profit at a financial game which IBM was specifically barred from continuing under the Consent Decree of 1956: Leasing companies only "rent" computers, and in their operations they use marketing practices and accounting techniques that, if carried out on a mass scale by one company, would bring the wrath of Justice down on them.

Leasing has developed into a substantial element in the computer industry -- primarily because IBM prefers to rent its computers. Today, about 10% of the computers in this country are on third-party lease, and EDP/IR estimates that about 15% of the computers shipped during 1968 were for third-party lease. And a recent survey conducted by the International Data Corp., which publishes EDP/IR, indicates that about half the executives in the companies surveyed are going to consider third-party leasing in future computer acquisitions.

Such an outlook for leasing, of course, preassumes a status quo within the computer marketplace. With the institution of full separate pricing, it could turn out that the price differential between leasing and renting the basic hardware would be insignificant . . . with software, training, and maintenance priced separately and probably higher than in today's "packages."

Analysis and prognosis

The filing of the Justice Dept. complaint may well be an important milestone in the history of the computer industry. Even though separate pricing was probably on the way, it will be termed an outgrowth of the complaint. Other shifts by IBM -- many of which were also on the back burner -- will definitely be considered reactions by IBM and part of the suspected behind-the-scene maneuvering by the parties involved.

What happens -- be it a new consent decree, a withdrawal of the suit after sufficient voluntary actions by IBM, or a court decision -- is most important to the future of the computer industry. It will shape the structure of the industry for many years to come.

EDP/IR considers the computer industry, which will soon be the world's largest, is unique. We certainly hope that in the process of resolving the legal issues that have been raised that the responsible parties take a careful look into the highly involved economics of the industry. Competition is certainly to be desired; equally desirable, however, is continued growth. We repeat our hope that the industry is not disrupted merely for the sake of striking out against the company that led it to its present healthy level.

The day before Justice filed its complaint, IBM announced its preliminary results for 1968. Earnings were up 33.8% to $871.5 million on gross income of $6.9 billion, up 28.9%. The company noted, however, that the growth of income from sales and rentals, up "only 15.4%," was a "better measure" of IBM's basic progress.

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EDP industry report 32

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 14,1969 • VOL.4,NO.20 P.J.McGOVERN,EDITOR

Providing for more from less?

SHARP COST INCREASES EXPECTED FROM IBM'S UNBUNDLING

"In keeping with its public statement made last December," IBM announced its so-called unbundling policy in a hand-delivered press release package that described a "new way of doing business" by its Data Processing Division. The new policy does make quite a radical change in the way IBM does business, in fact, and by the time all the twists and wrinkles are ironed out, the computer marketplace will be covered with a whole new cloth.

The scope of IBM's unbundling action was broad indeed, with only maintenance and some very basic software retained as part of the machine price. The reduction in price, however, is very slight, and this comes as a relative shock to many industry observers. They read IBM's announcement to mean quite a steep increase in the user's data processing costs.

Under the new pricing scheme, IBM has added several additional income sources for tapping its existing base of customers. Thus, it would be quite possible for IBM to achieve greater revenues from a smaller share of the computer market. Here's a rundown on unbundled pricing:

- All systems engineering services -- the technical help offered "to assist customers in the installation and application of data processing systems" -- will now be charged at an hourly rate.

- Education, previously considered one of the important "give-aways" in IBM's marketing package, will also be charged to the customer. Prices seem based more on what the market will bear than on the actual cost to IBM. This move shocked users most in EDP/IR's initial survey of computer customers.

- Almost all new software -- including all Type II programs and other new basics such as sorts or compilers -- will be redefined as a "program product" and as such is available to users under a license agreement, essentially equivalent to monthly rental.

- Under a new type service, called custom contract services, IBM will "assume responsibility for performance of specified tasks, such as the design and installation of a data processing system." This move, essentially, could put IBM into competition with the facilities management companies currently in vogue.

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All of the price changes listed above are effective immediately for new orders and will become effective Jan. 1, 1970 for customers with computer systems currently installed or on order. Along with the announcement of this pricing separation, IBM also said that it is reducing the lease and purchase prices of its computer equipment by approximately three percent. This reduction is retroactive to June 16 for purchased equipment, and becomes effective Oct. 1 for customers with equipment on rental.

Some implications of unbundling

Until computer users start paying unbundled prices and competitive forces develop within the marketplace, the exact rules of the new game will not be known. As this happens during the next few months, EDP/IR will devote several issues to examining the effects of unbundling on various portions of the computer industry. At this time, however, there are some general observations which give a reasonable indication of what is to be expected:

- The actions taken by IBM represent a price increase of at least 5%, and this increase could well grow to 30% above current prices within a year.

- Unbundling marks a definite change in the revenue structure of the computer industry. In the future, the importance of hardware revenue will be lessened and there will be a compensating major shift of emphasis toward service revenue.

- In light of the first two items, IBM apparently has decided to continue to concentrate its efforts at achieving systematic growth in profits, even if these come from a smaller share of the marketplace. Thus, the growth rate in equipment deliveries could drop.

- The attention of the IBM salesman will be concentrated -- at least for the short term -- on software and systems engineering services. As a result of this, the salesman may for the first time gain a true insight into the application problems of his user.

- Because of the separate pricing schedules and the probable increased costs, the user will have a tremendous economic incentive to gain a firm grasp on his entire data processing costs.

- Early reports are that new products expected for System/360 will not be introduced until next year. This will definitely have the effect of teaching IBM salesmen to be "tigers" in the software market as they traditionally have been with hardware.

Every industry firm that has spoken out has expressed at least limited approval over IBM's new direction. In one sense, it would seem to us, IBM has broadened its umbrella to protect more of the computer industry than was previously the case. Also, although it is really too early to tell for sure, the initial reactions are that IBM's actions will lessen pressure from the companies that are sueing under antitrust laws, and perhaps set a pattern for the eventual agreement between IBM and the Justice Department. On these points, only time will tell. In the remainder of this issue of EDP/IR there is a full presentation of exactly what IBM has announced to date, some of the initial reactions, and our preliminary analysis. More will follow during the summer.

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The prices the users will pay

All the costs under IBM's new separate pricing are not known. For the record, however, some initial figures have been provided by the company:

- Systems engineers will be billed on the basis of the type of computer they are called on to work with. Basic systems service (the 1130, 360/20, etc.) will cost $66 for a "half-day," three-hour unit plus $22 per extra hour; general systems will be billed at $84 for the initial unit plus $28 per additional hour; and complex systems (360/65s and larger, plus the 1800 process computer) will run the user $105 plus $35 for each additional hour after the minimum period.

- More than 50 "professional-level" classroom courses will be offered for a charge, with courses announced before these new policies continuing to be free until the first of next year. IBM's charges for its professional courses will "vary widely according to content." A couple of examples offered by IBM are: "System/360 Operating System Advanced Coding," for $460 per student, and "System/360 Continuous System Modeling Program," for $170 per student.

- Program products, to use IBM's new terminology, will vary even more in price. These will be licensed for a designated central processing unit, and "the customer may use the same program on additional CPUs by paying for an additional license for each CPU." At present, monthly charges have been established for 18 programs; more will be added as time passes. The charges vary from $1500 a month for IBM's "Generalized Information System," down through $600 a month for its "Information Management System," to $125 for an "Order Allocation System" and $50 for "Medical Information System, Version II."

Reaction from the competition

Speculation about the nature and timing of IBM's announcement had been Topic One for weeks to most people in the computer industry. Therefore, once the announcement was made, EDP/IR started talking to both computer companies and users throughout the industry. Most people by now realize the importance of IBM's announcement, and companies in the computer industry have begun to plan their marketing strategies. Not many have announced them.

Most of the other computer manufacturers remain quiet. Burroughs had already essentially prepared its move into the separate pricing area by announcing that application packages for several of its accounting machines as well as the TC 500 could be acquired separately. In a statement quickly following the IBM release, Ray McDonald, president of Burroughs, said: "We feel that the customer should know how much he is paying for basic equipment, and that he should have complete latitude in selecting the amount and type of software that best fits his requirements. In accordance with our program, we are preparing a pricing policy for larger EDP systems which will separate hardware, software, and service charges. We have informed present and prospective users that they will have the option of applying such a policy to their contracts when it is announced." Nothing more has been announced.

Honeywell was the only other manufacturer to make a statement in reaction to the IBM decision and this came over a week after IBM's initial release.

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Essentially, Honeywell announced that it will maintain its original pricing policy for computer systems and will raise rental prices by approximately one percent, "reflecting rising costs of labor, materials, and interest." It also pointed out that adjustments in maintenance rates will be made for purchased systems. Honeywell emphasized that existing customers will probably not be affected during the term of their current agreement.

It is expected that the other manufacturers -- perhaps even Honeywell -- will announce some form of separate pricing before this year is over, or at least shortly following January 1, when IBM discloses its new sales plan.

The user looks like the big loser

Until users gain some practical experience operating with unbundled pricing, there is no way to measure the amount of cost increases or decreases. It would appear reasonable that costs will start off minimally higher, then increase as more and more program products are introduced . . . and as IBM salesmen become more adept at selling software and services.

To assist readers in evaluating possible increases in cost, we have reprinted here our analysis of how IBM had allocated costs to customers under its bundled operation (EDP/IR Apr.4,1969). If these estimates are correct, the portions of cost that have been unbundled -- software, custom system analysis, and education -- represent 25% of the customer's cost. These figures should still be useful in examining the possible cost of unbundled services.

Under IBM's new policies, the user essentially will be getting only the equipment and the maintenance portions of the total package he once received -- the items on the top and bottom lines of the accompanying table. Thus, it would appear the IBM customer will soon be paying 97% for what he previously paid 75%. There is a question, of course, as to how much additional service the customer will purchase from IBM. But it seems reasonable to EDP/IR that the typical

ESTIMATED ALLOCATION OF COSTS TO CUSTOMERS

	Direct	R&D	Marketing	Admin.	Total	Total
Equipment (Manufacturing and Engineering + 1/2 Software Development)	24.5	3	10.5	6	44	58.5
Software (Customer Support-Software + 1/2 Software Development)	5		2	1.25	8.25	11
Customer Support-Custom System Analysis	4.5	1	2	1	8.5	11.5
Customer Support-Education	1		.5	.25	1.75	2.5
Maintenance	10			2.5	12.5	16.5

THESE FIGURES ARE ESTIMATES PREPARED BY THE INTERNATIONAL DATA CORPORATION

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customer will buy at least 1/3 of the total amount he was getting previously. In that case, the simple dollars and cents point out that the customer's expenses for software, education, and systems engineering will start out at something like 6% to 10% above what he is now paying and probably will rise within the next year to the current level . . . giving essentially a cost increase of about 30% over what is being paid today.

It would seem to EDP/IR that the very large installations probably will have the least increase in costs, especially over the short term. The small and medium sized installations with their limited in-house resources will probably see their costs rising more rapidly. This is particularly probable in light of the fact that IBM -- for the next six months -- has given its salesmen a 10% commission on any systems engineering services that are sold.

The implication of this would appear to be that software marketing will become a real "dog-fight" situation, and perhaps that IBM will attempt to keep its income flow sustained by selling of SE services and software packages rather than pushing equipment already marketed for over five years. Around January 1, 1970, IBM is expected to announce a big package of equipment and to put into effect a new sales plan designed for unbundled selling.

New personnel requirements

Under unbundling, there will be several changes in the personnel requirements for operating computer centers, and there will probably be much more emphasis on personnel selection and training. For one thing, the "data processing manager" will soon have to become a new type of person. Previously, the DP Manager simply had to select the best vendor and then go about making sure he was delivered what was promised.

Very shortly, however, this job will be one of evaluating equipment, software, education, and other types of services, and could well challenge the DP Manager in many ways that were not required before. Add to this the fact that we will probably have a proliferation of software and support companies, and the personnel requirement rapidly is for the type person who even today is in very short supply. This might encourage the growth of so-called "facilities management" companies and/or benefit IBM's new custom contract services operation.

General effects on business

Indeed, facilities management companies — or IBM with its custom contract services — may well offer the only practical prospect for small and medium-scale users to have reasonable control over their computer costs. Some facilities management companies have voiced complaints about IBM's possible competition, but it seems to EDP/IR that the positive or umbrella effect of IBM's entry into the field will be more helpful than harmful to competitors.

Generally speaking, our current analysis indicates that IBM probably has made it easier -- or at least no harder — for most companies in the computer industry to compete successfully. On the other hand, IBM doesn't seem to have done anything that will hurt its position, and it could well have made a move that will bring to it, and perhaps most other companies in the industry, more revenues, at least over the short term. And the user may have a chance to benefit. As IBM competes with other software suppliers, the added value of its products may well offset the increased costs to the user.

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In its press release, IBM describes the history, rationale, and details of its pricing changes. This announcement, which EDP/IR considers significant, is reprinted below. We have underlined phrases of exceptional interest:

ARMONK, N.Y., June 23 . . . In keeping with its public statement made last December, International Business Machines Corporation announced today that certain systems engineering activities, most future computer programs, and most customer education courses, previously furnished without charge, will now be offered for a charge in the United States. Generally, these changes are effective immediately for new orders and will become effective January 1, 1970, for customers with machines installed or on order.

Coincident with this action, the company is reducing data processing equipment lease and purchase prices by approximately three percent. New purchase prices are effective for all equipment installed on or after June 16, 1969. New lease prices are effective October 1, 1969.

This price reduction reflects IBM's best approximation of those marketing expenses which will no longer be provided for in prices of currently announced equipment. This new method of doing business by the company's Data Processing Division does not represent a general price increase or decrease. The effect upon individual customers will vary. Many of IBM's customers will be able to take full advantage of the full amount of the equipment price decrease, while others will find their cost of data processing has increased, although their payments to IBM will not necessarily increase. IBM does not anticipate an increase in its revenues over the short term as a result of these actions.

IBM announced last December that a study had been underway which was expected to lead to changes by July 1, 1969, in the way the company charged for and supported its data processing equipment. This study was initiated prior to the filing of lawsuits against the company by the Department of Justice and several others, attacking the furnishing of programs, systems engineering and other services without charge. The extensive charges announced today have taken into account complaints and opinions from others in the industry and from the Government.

Because these changes represent such a significant departure from past practices, there will be a six-month transition period -- ending December 31, 1969 -- so that IBM and its customers can make the necessary adjustments to the new environment. During the transition period, customers with equipment installed or on order will continue to receive, without charge, data processing education, as well as systems engineering services to the extent such services have been mutually planned by IBM and the user.

The practice of furnishing customer support without charge dates back to the earliest days of the punched card industry. With the advent of the computer, IBM, in common with other computer manufacturers, carried on this practice and furnished systems engineering assistance, programs and education as a part of its marketing activities. Through this means, the company stated, computer manufacturers have been able to assure more effective use of new and complex machines by their customers. This approach also has facilitated the open interchange of programming concepts, which has been so vital to data processing users. The unprecedented expansion in the use of data processing equipment has been aided greatly by this support from manufacturers.

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Although predictions for the future in a field as young and volatile as the computer industry are hazardous, there are a number of indications that pricing of services ultimately will become an industry practice. These include:

1. Business opportunities for IBM and others, developing out of the growing need for increasingly complex and comprehensive systems support;

2. The increasing support requirements arising from the relocation and reapplication of a large number of systems owned by others;

3. A limited but increasing number of enterprises engaged in the development of computer programs for sale.

Highlights of today's announcement:

-- Systems engineering services, available for a charge, are provided to assist a customer in the installation and application of his IBM data processing system and to increase the customer's overall data processing proficiency. Services are offered in three skill classifications based on the complexity of the equipment and the way it is used in an operating environment. The services will be scheduled in half-day units.

-- Professional courses designed to assist users of IBM equipment in the education of their employees are offered for a charge. Course prices vary widely, depending on course content. Although IBM does not intend to solicit applications for its data processing education courses from the general public, it will accept applications from anyone meeting course prerequisites.

-- Program products, as distinct from system control programming, will be copyrighted and offered for a monthly charge under a license agreement. Program products contain logic directly related to the computer user's data and enable a system to accomplish a specific end result for the user. Each license will permit the customer to use a program product on a single designated central processing unit. Charges for program products will vary widely. System control programming is an essential part of a data processing system. It is fundamental to the operation and maintenance of the system and will be made available as part of the system. All programs currently available from IBM's program library continue to be in the public domain and available as in the past.

-- Custom contract services, a new offering, also was announced. Under a custom contract, IBM will assume responsibility for the performance of specified tasks in the areas of systems design and analysis, application and program development and systems installation and evaluation.

IBM's Field Engineering Division will continue to maintain both purchased and leased equipment in the same manner as in the past. As a result of today's changes, the Field Engineering Division also will assume a broader role in providing services for IBM programming. This includes responsibility for furnishing field services on all IBM-supported programming and responding to emergency calls on all other programming used on IBM systems.

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 9,1970 • VOL.5,NO.11 P.J.McGOVERN,EDITOR

Many questions remain unanswered

FCC ANNOUNCES TENTATIVE DECISION IN COMPUTER/COMMUNICATIONS INQUIRY; DATA PROCESSING SERVICES TERMED "COMPETITIVE" AND WON'T BE REGULATED

The obituary for Docket 16979 was written into Paragraph 10 of the Tentative Decision just handed down by the Federal Communications Commission:

> . . . since the inception of this Inquiry, major progress has been made and is continuing toward improved and more economical communications services for computer users. These developments also lead us to the conclusion that the questions relating to interconnection or to the need for other improved common carrier service offerings, regulations and practices to serve computer needs, can best be handled through rate, tariff and licensing proceedings that are now pending or that may be initiated in the future, rather than through a continuation of our Inquiry . . .

Thus, after three-and-a-half years (EDP/IR Nov.15,1966), the Inquiry is closed.

> [It] was initiated November 10, 1966, to provide a public forum for the examination, discussion and resolution of a number of regulatory and policy questions that appeared to be emerging from the growing interdependence of computers and communications services and facilities.

In closing the Inquiry, the FCC has left unanswered some sticky questions, and these will likely be buffeted about in lengthy proceedings as individual tariff and license cases are heard. But the FCC does tackle the key question of regulation of data processing and message switching services offered by common carriers and by non-regulated companies:

- Data processing, including remote processing, will not be regulated. Thus, because of the 1956 consent decree, AT&T is locked out of the pure data processing business; but, such services offered by other common carriers will not be tariffed.

- To offer data processing services, however, other common carriers will have to set up separate subsidiaries.

- Systems that have both data processing and message switching get a new name -- hybrid systems -- and will be regulated if, and only if, message switching is the main purpose of the system and data processing is an incidental and integral part of the system.

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So far, so good. But several other questions were raised in the 1966 Notice of Inquiry, a document that launched what, at the time, we suggested could be a "sweeping inquiry into the interrelationships between computers and communications." As a partial answer, the FCC says that good progress has been made toward providing better tariffs, more liberal interconnect rules, and consideration of special service carriers.

On the latter point, in fact, the FCC called "significant" its four-to-three decision that allowed Microwave Communications Inc. to go ahead with its Chicago-St. Louis microwave link (EDP/IR Dec.31,1969). And it mentioned that it is considering the Datran proposal from University Computing. But a spokesman for the Commission says no implied acceptance -- or rejection -- can be read into this.

And on the final untouched issue -- that of privacy -- the FCC says there are "numerous social and public policy implications which go well beyond the pale of our jurisdiction over communications and which have already been the subject of Congressional studies and hearings . . ." It noted that the National Academy of Sciences is conducting an investigation on this subject.

In essence, then, informed experts think the FCC seems to have acknowledged developments in the communications and data processing industries to date as faits acomplis, and that it has hedged in establishing future guidelines. And this is unfortunate. When the FCC instituted the inquiry, it appeared to have dared foresight and an enlightened attitude that is lacking in many regulatory bodies. Now, it seems, the FCC has reverted to the more traditional practice of piecemeal decision-making . . . which may be its only practical approach.

Here lies The Inquiry: 1966-1970

The inquiry "In the Matter of Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities" was launched during the fall of 1966 . . . back when time sharing was primarily a scientific curiosity and "computer utility" was an academic concept rather than an advertising slogan. It was beautifully timed.

And interest in this area was high. Sixty-one organizations -- including major companies and associations in the data processing industry, carriers and manufacturers of communications equipment, commercial users of data systems, governmental groups including the Department of Justice, and others -- submitted more than 3000 pages of material to the FCC.

In March of 1968, the Commission contracted with Stanford Research Institute (SRI) to evaluate the responses and submit recommendations. A year later SRI delivered its results to the FCC: The responses were digested into only 430 pages, and an additional 400 pages were added. Quite quickly, then -- by May 1, 1969 -- the FCC adopted a Report and Further Notice, 21 interested parties responded, and the record was closed on July 24, 1969. On April 2, 1970, the Tentative Decision was released and interested parties have until May 13 to file comments.

The three-and-a-half years consumed by this process may have been necessary . . . many organizations, varied interests, and complex questions are involved. But technology doesn't stand idle for learned debates and analyses.

So we are forced to question the method adopted for carrying out the Inquiry. The need for such an Inquiry was apparent, and it was well presented in the orig-

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DEFINITIONS OF SPECIFIC TERMS

In its Tentative Decision, the FCC says that before any issues can be resolved, it is "necessary to define as precisely as possible the terms we shall employ." It continues with the understatement that "in this highly technical and rapidly growing industry, new terms, many of which may overlap in meaning, have proliferated," and that "we need to establish definitions that are as free from ambiguity as language permits." Presented below are "basic" terms which the FCC considers "indispensable to our objective of providing clarity and precision of definition and application:"

- Data Processing -- The use of a computer for the processing of information as distinguished from circuit or message-switching. "Processing" involves the use of the computer for operations which include, [among other things], the functions of storing, retrieving, sorting, merging and calculating data, according to programmed instructions.

- Message-switching -- The computer-controlled transmission of messages, between two or more points, via communications facilities, wherein the content of the message remains unaltered.*

- Local Data Processing Service -- An offering of data processing wherein communications facilities are not involved in serving the customer.

- Remote Access Data Processing Service -- An offering of data processing wherein communications facilities, linking a central computer to remote customer terminals, provide a vehicle for the transmission of data between such computer and customer terminals.

- Hybrid Service -- An offering of service which combines Remote Access data processing and message-switching to form a single integrated service.

** In a rather long footnote, the FCC points out how message-switching should be distinguished from circuit switching even though "both functions involve the interconnection or transfer of electric signals from one channel to another." Historically, says the FCC, message-switching, typified by the telegraph industry, involved a carrier's providing an open channel for two or more direct electrical connections. It is essentially a 'store and forward' function. "Circuit-switching, on the other hand, involves the establishment of a completed transmission path prior to the communication of any information." The speed of computers, the FCC continues, has blurred the historical distinction but its importance remains. In circuit-switching, the information flow is through a switching matrix, not the computer; in message-switching, "any information transmitted from terminal points must necessarily pass through [the computer] and undergo some processing by the computer."*

inal Notice. And the timing, probably, was optimum. The coming need was certainly recognized by a few people two or three years earlier, but we honestly wonder how many organizations that responded to the 1966 Notice would have been capable of presenting a reasoned answer to the same request published in, say, 1963. If this could have been done, then the obvious solution is for the FCC and/or similar agencies to attract very bright "industry philosophers" who can ponder the future and formulate questions five years before their answers are needed; if this is impossible, perhaps the ease-by-case approach is the best after all.

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The FCC and data processing

For data processing companies, the good news from the Tentative Decision is that the FCC has not decided it can regulate the industry; the important news is that data processing services provided by common carriers (except for AT&T, which can't offer them) will not be regulated. The question of whether or not the FCC even has jurisdiction to regulate data processing offered by non-carriers is not really answered.

The FCC makes a big to-do over its charter and whether or not it has the right to regulate communications modes that weren't in existence when the Communications Act was written in 1934. It argues that it does. Also, it says that there is justification for Government intervention when the free enterprise system breaks down, but then makes a strong case for the active competition that now exists in the data processing marketplace.

As a matter of fact, the Commission executes an impressive dance among eggshells as it writes this portion of its decision. While the statement contains no flat declaration that the FCC actually has the power to regulate the data processing market, it leads the reader to believe that the FCC thinks it has this power. For example, the narrative concludes:

> However, if there should develop significant changes in the structure of the data processing industry, or, if abuses emerge which require the exercise of corrective action by the Commission, we shall not hesitate to re-examine the policies set forth herein.

Thus, the Commission isn't rescinding whatever power it may have over data processing in general.

The common carriers and data processing

With the exception of Bell System companies, says the FCC, communications common carriers will be allowed to provide data processing services through separate, unregulated corporate entities. This decision, however, once again appears to maintain the status quo. General Telephone and United Utilities -- the two largest independent carriers -- already have computer service subsidiaries; so does Western Union, which the FCC seems to think will benefit from more diversification via this route.

There are fears from several quarters over allowing carriers into data processing, but the FCC answers these head on:

> The dangers identified by respondents and by the SRI study relate primarily to the alleged ability of common carriers to favor their own data processing activities by discriminatory services, cross subsidization, improper pricing of common carrier services, and related anti-competitive practices and activities. We recognize that these dangers may be real and could have substantial adverse effects on non-carrier data processing companies. We are confident, however, that the steps we are taking herein will provide adequate protection against possible abuses. On the other hand, the additional competitive spur provided by carrier participation in data processing can and should, with the specific safeguards, promote innovation, efficiency, economy, and diversity with resulting new and improved services at lower prices to users of data processing.

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Proposed Rule: FURNISHING OF DATA PROCESSING SERVICES

Along with its Tentative Decision, the Federal Communications Commission submitted Proposed Rule 64.702. After prohibiting common carriers from furnishing data processing service to others in any other way, the rule says:

(b) Except for the Bell System companies, common carriers may, subject to other provisions of law, have a controlling or lesser interest in, or be under common control with, a separate corporate entity that furnishes data processing service to others provided the following conditions are met:

- Each separate corporation must maintain its own books of account, have separate officers, utilize separate operating personnel, and use equipment and facilities devoted exclusively to the rendition of data processing services;
- Each such common carrier shall file with the Commission a complete statement of the terms and conditions of every written or oral contract, agreement or other arrangement entered into between such carrier and any such separate corporation; and
- No carrier [with operating revenues exceeding $1 million] shall engage in the sale or promotion of data processing services on behalf of its data processing affiliate.

A new kind of "hybrid" for the computer industry

In 1966, just before the FCC Inquiry was announced, Bunker-Ramo Corp. got into a hassle with the common carriers in setting up Telequote IV, a service designed to supply information on securities and forward messages. Such a system is a good example of what the FCC calls a "hybrid system." It involves both message switching and data processing and the primary purpose is moot.

Because of such services, the FCC has asked the question as to when message-switching, when offered in combination with data processing, should be treated as a sale of communications, and therefore regulated. In the next sentence, the Tentative Decision says: "There is no pat formula . . ." But it offers a general guideline. When message switching is an integral part of and incidental to a data processing package, "there will be total regulatory forebearance," except for the case where carriers are offering such a service through affiliates. "If, on the other hand, the package offering is oriented essentially to satisfy the communications or message-switching requirements of the subscriber," the service will be subject to regulation. So case-by-case decisions will be the rule, and "these distinctions [will] be carefully applied" so that the "essential nature" of a service will not be "artificially obscured."

Under the above hybrid theory, AT&T will be able to offer the new user services it has talked about for Touchtone telephones. But the FCC implies that it will be ever vigilant. "We intend to maintain a careful and continuous observation of the activities of the Bell System companies in their use and application of computer technology . . . to the end that [they] shall not offer data processing which is not clearly incidental to communications . . ."

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FCC REQUESTS SATELLITE SYSTEM PROPOSALS

Shortly before the FCC officially ended its computer/communications inquiry (page 1), it launched another stage in the domestic satellite inquiry which also was opened in 1966. In a "Report and Order" about the Establishment of Domestic Communications-Satellite Facilities by Non-Governmental Entities (Docket 16495), released March 24, the Commission urged organizations to present detailed applications for satellite systems and comments on proposed rule makings. In this:

- The FCC asks would-be satellite system sponsors to file proposals for various special, general-purpose, private, or common carrier facilities. These will give its Commissioners a concrete basis for determining policy.

- Since AT&T's role in the satellite communications area is crucial, the FCC has asked for comments. Should the dominant carrier of earth-bound communications also be allowed to launch its own satellite, or only to lease circuits? Should AT&T stick to public message service, or carry private data, TV, and other special-service transmissions as well?

- Conflicts over scarce frequencies and orbital parking slots are likely to arise. The FCC calls for suggestions on resolving these difficulties and on policies toward procurement of the facilities.

The FCC says it will "proceed with the authorizing process as promptly as possible," but the time it takes to file proposals, obtain approval, and construct a system will likely cost the United States another three, four, or more years before it gets its own satellites for TV, data, and voice communications.

Million-dollar bid

Even the FCC admits that it may cost about a million dollars to prepare the detailed application needed for a domestic satellite system. Of course, construction costs could run to 100 times that amount, so the Commission doesn't expect to get many such propositions. The only organization which so far has said that it intends to file an application is Communications Satellite Corp., or Comsat. This company -- owned 29% by AT&T, 8% by other common carriers, and the rest by the general public -- has the U.S. monopoly on international satellite communications. (It wholesales circuits to common carriers, who retail them to the public.)

Two groups control what may be key chunks of potential satellite business -- broadcasters and AT&T. A successful satellite network would have to carry transmissions from at least one of these if it is to survive. But the three television networks are studying the situation . . . and Bell hasn't yet said whether it will launch its own satellite or lease circuits on someone else's.

Conflicting opinions

Since Intelsat's first "bird" went up in 1965, the costs of international communications have been melting. Indeed, Malasia is the latest country to hook into the world-wide network of ground stations coordinated through the International Telecommunications Satellite Consortium. And General Electric said last December that it is testing time-sharing service via satellite to London-area customers.

So the technology is here. "Novel questions of law and policy," however, (and pauses while task forces appointed first by Pres. Johnson, then Pres. Nixon, studied

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the issue) have stalled authorization of any satellite facilities since ABC's 1965 suggestion for a domestic television broadcast system. And now, five years later, everyone may wait some more until the networks restudy the question and decide what they want to do.

In January, the White House sent a Memorandum to FCC Chairman Dean Burch, appointed last fall by Pres. Nixon. This memo set forth the Executive Department's opinion on the satellite matter and suggested that satellite communications be completely opened to all comers so that the market could decide which participants and what types of setups were, indeed, the most efficient. Under this suggestion, there would be checks placed on common carriers so that there would be no possibility of inter-service subsidization or other problems traceable to the carriers' monopoly in traditional communications.

But at the Federal Communications Commission, where the buck stops, the approach is more conservative. The FCC has thrown open its door for proposals from all comers. But it warns in its Report that applications may be turned down even though the costs of filing are high. Free entry is just one of the FCC's criteria.

According to the White House brief, technical and financial qualifications should be the only test for allowing non-carriers to put up systems, and economic viability or the effect on AT&T and other carriers should not be taken into account. The FCC, however, may chose to weigh these latter two factors, as well. So the standards by which possible systems will be judged, as well as the outcome of the judgement, seem to be in question.

One point in the report, however, is clear. There should be some kind of domestic communications satellite service. And of the remaining uncertainties -- about demand for service, costs, and frequency allocations -- the FCC says:

> In our judgement, however, these uncertainties cannot be resolved by another round of written comments or by additional studies. Indeed, a critical consideration in this respect would appear to be what persons, with what plans, are presently willing to come forward to pioneer the development of domestic communications satellite services . . .

Satellite communications for computer users

Transmission via signals bounced off a satellite may offer unique promise as a way of reaching many receivers from one relay point. Also, it eliminates much of the switching required in terrestial networks. And communications costs are not related to distance, except for local loops needed to connect users to ground stations. It is for reasons such as these that GE has told the FCC that time sharing -- including nationwide access to centralized data bases -- and other computing operations would adapt well to satellite communications.

Before satellites for such purposes can be launched, however, the FCC must settle a basic issue: Should special-purpose carriers and private users put up a system, or should the major carriers control a single, general-purpose network of satellite and ground stations. Several companies now have applications before the FCC asking for special-purpose carrier status so that they can provide surface microwave communications to data processing users (EDP/IR Dec.31,1969). And one of these -- Data Transmission Co. -- has mentioned satellite circuits as a potential link in its hoped-for nationwide network. It says it will file comments on the satellite inquiry with the Commission.

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EIDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 30,1971 • VOL.6,NO.19 P.J.McGOVERN,EDITOR

Rookies crash the league

40%-50% GROWTH PROJECTED FOR DATA CARRIAGE AND INTERCONNECTION GEAR AFTER FCC DECISION KICKS OFF DATA TRANSMISSION FREE-FOR-ALL

The "look-alike independents" will once again be trying to score with U.S. computer users. But this time, the gutsy newcomers will be microwave carriers, and the giant being challenged is AT&T. Relax. The hoopla won't commence before 1974, by which time the two biggest new systems should both be in service.

On May 25, 1971, the FCC announced a unanimous decision which has thrown open the market for data (as well as leased-line voice) transmission. It says that any qualified firm may provide public communications as a specialized carrier. This means a turn at bat for Microwave Communications Inc. (MCI), UCC's Datran, and other prospective microwave carriers. To chalk up a hit, though, they will have to convince computer users they have a service clearly cheaper and/or clearly better than that of the old pro, Mother Bell. Like the independents vis-a-vis IBM, MCI and Datran will be extremely vulnerable to competitive reactions by AT&T.

- Data transmission has been exploding at a rate of 40-50% annually, from a very small base. This year it accounts for less than 2% of communications revenues -- a drop in the bucket. Over the next four years the drop will multiply to over 5% of the total, or $1.8 billion.

Two new sectors are being spawned, with the permission of the FCC. They are: specialized common carriers (of voice and/or data communications); and independent suppliers of interface equipment (modems, multiplexors, and concentrators).

- For the would-be specialized carriers, the FCC's decision is just a hunting license. They will still face major obstacles . . . the biggest, obviously, being AT&T. Bell will be allowed to cut prices in order to compete "fully and fairly" with the new carriers.

- The end-user market for interconnection gear should surge at over 40% per year from its 1970 $150M base. AT&T will supply most low-cost modems; the independents will have to track OEM contracts, sales of big-ticket items to users, and later, MCI and Datran buys.

This issue outlines the opportunities and problems facing these two groups of companies. The data is based on a report by the Corporate Planning Service of International Data Corp., publisher of EDP/IR. The next page gives an overview of the penetration of communications into the world of electronic data processing.

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One out of four CPUs are communications-oriented

Only a little over 25% of general purpose computers are being used even partially in communications applications this year. Whether that's a lot or a little depends on whose book you've been reading. With IBM definately pushing the communications environment, by 1975 this proportion will hit 35%. And this understates the case, since by then, IDC predicts, 60% of computer renting for more than $5,000/month will be used in some kind of communications application.

Last year's squeeze highlights the rise of communications. In 1970, most computer users were carefully watching their budgets. But data communications line and equipment spending was up about 40%. The table below shows EDP/IR's estimates for the high growth rates of data communications line charges and interconnection equipment, and the somewhat slower -- but impressive -- rise in terminal spending.

DATA PROCESSING VS. DATA COMMUNICATIONS
($ Millions of User Expenditures -- U.S. Only)

Year	Computer System Hardware	Terminal Hardware	Interconnection Equipment	Carriage of Data
1968	$ 4,250	$150	$ 75	$ 135
1969	5,100	195	110	290
1970	5,600	250	150	280
1971	6,200	330	215	405
1972	7,200	445	300	600
1973	8,275	590	425	875
1974	9,450	775	600	1255
1975	10,750	975	850	1755

As the table indicates, data transmission revenues are soaring, but from a small base. Nobody (not even AT&T) knows exactly what portion of communications revenues come from data, but IDC has made estimates that other experts seem to agree with: From just over $400 million in 1971, data transmission revenues are expected to hit $1.8 billion in 1975 -- a big number, but a not-very-dramatic 5% to 6% of the expected communications carriage total.

The dial network accommodates low-speed data terminals, including the ubiquitous Teletype. From user surveys and estimates of the number of terminals in use, IDC estimates that data revenues over the voice network will hit $105 million this year. So despite the ads, this isn't much business for Bell.

The voice/data split on dedicated leased lines is also hard to pin down, since many companies use leased lines for both . . . voice by day and data by night. As the chart shows, IDC expects this type of service to account for roughly $300 million in 1971. Adding these up -- and looking out to 1975 -- it looks as if the specialized common carriers can expect $150 million to $200 million if they can grab 10% of the market. Their prospects are discussed in the following sections.

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THE DATA TRANSMISSION MARKET

The Federal Communication Commission's decision is merely a pat on the head and permission to enter the game for the specialized carriers. It doesn't provide them with any "protective umbrella." The question is, will Mother Bell?

There are some obvious parallels between the situation of the prospective carriers up against AT&T and the situation of the independent memory makers up against IBM. Many of the marketing problems are the same, and so are the targets. In communications, as in computer equipment, users basically don't want the confusion of multiple vendors and, to start out at least, they consider independent offerings guilty until proved innocent. But the biggest users are willing to be convinced.

However, the analogy has its limits. After all, communications will continue to be subject to regulation right down to specific tariffs -- when the FCC has time -- and the Justice Dept. can hardly cry monopolist on a company when administrative policy has historically ordained for it nearly that position.

And AT&T could turn out to have a "threshold of pain" considerably lower than IBM's fabled 10-12%. Although only a few percent of its business is being challenged, Bell has fought tooth-and-nail against permission for the independents to enter even this small sector. Its possible market tactics are discussed later.

What's in the independents' bag

In the computer industry, independent disk and tape drive vendors touted performance, but they mainly got their footholds through 15-20% discounts under IBM prices. In the communications area, however, users may be sold by performance characteristics or by factors indirectly related to price -- as well as by price itself. An IDC survey indicates that cost is just one gripe of communications users (who, by the way, are in general remarkably satisfied). They also object to:

- the high cost of using modems

- high error rates

- long delays in getting leased lines and certain types of equipment

- the limited availability of transmission speeds

- the tariff structure (geared to voice rather than data)

Data Transmission Co. (Datran), the MCI group, and several other companies aim to change all that by offering transmission services tailored more closely to the data user's needs. The MCI and Datran networks, described below, are of two basically different types. (See EDP/IR Dec. 31, 1969 for more details.)

- Datran's switched end-to-end digital network will cost an estimated $350M to construct, and the company says its initial 35-city system will be in operation by early 1974. So far, there's no news on how the UCC subsidiary will finance construction, except that UCC will be a "major factor." An announcement on this crucial point is due soon.

- The MCI companies will offer point-to-point voice and data communications over leased capacity. One link is already up and running, on a test-out basis, between Chicago and St. Louis. The company has

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said it will probably start service in the Northeast in about a year. Over half the MCI companies are fully financed; the others are in the process of arranging additional financing to cover their equipment needs, according to a company spokesman.

- Five other companies have applied for systems ranging in estimated equipment cost from $12.5 to $26.5 million. They are: Southern Pacific Communications Co., United Video, Western Tele-communications, Inc., Nebraska Consolidated Communications, and New York Penn. Microwave Corp. Several others propose smaller systems.

All the applications together stack up to an estimated equipment cost of nearly $600 million, for over 1900 microwave stations.

There's just one nut left to tighten in Washington: the FCC must approve individual site applications before construction can start. This requires hashing out technical details so that transmissions from new microwave towers don't interfere with existing routes. For all practical purposes, though, the regulatory battle is won. What remains is the marketing battle . . . and that will be tough, considering that the main opponent, AT&T, has a near-monopoly in communications, $17-billion a year in sales, and a far stronger entrenchment in its field than IBM ever had in computers.

Gulliver vs. the Lilliputians

Something else that had better be in the independents' bag is aspirin, because the next few years hold plenty of potential headaches. AT&T, whether in its role as supplier of local connections or as competitor, is the likely cause.

The coming match will be staged under new rules for the regulated communications field. The White House, the FCC, the prospective new carriers, and even Mother Bell all seem to agree that "full and fair" competition is in. (AT&T said at one point it was "pleased" with the Commission's decision.) But when it comes down to calling specific AT&T moves, they probably won't all agree on how to tell "full" from "foul" from "fair." The FCC will face the tacky problem of spelling out just what kind of pricing is allowable. Its decision mainly set broad guidelines.

However, one important policy switch specified: the Bell System will be allowed to selectively cut prices where necessary to meet competition -- i.e., over the high density routes which the specialized carriers plan to serve. This is a split from the traditional nationwide rate averaging requirement. Rate cutting is just one competitive tactic available to AT&T. For another, it can write more flexible tariffs, for instance allowing more sharing of broadband channels. (One such tariff is already in effect in a few states -- the Series 11000.)

In addition, AT&T has said it will offer an end-to-end all-digital switched service for data users by 1973-74. Bell officials won't give out details, but the proposal looks remarkably like Datran's concept.

Knocking for a local loop

Another possible hitch is in getting connections between trunk routes and customer sites. To start out, MCI and most of the other specialized carriers will get local loop service from their favorite competitor, The Telephone Company. Bell has agreed to interconnect, but it hasn't set tariffs. A high price, possible

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delays in installation, and the need to have additional modems to interconnect with AT&T local loops could all combine to outweigh the advantages of going to the specialized carriers in the first place.

On the other hand, if the new carriers want to build their own local distribution facilities, they need permission from state regulatory commissions. As a recent Computerworld article points out (in the July 28, 1971 Communications Supplement), this approval may not be easy to get.

Datran says it plans to provide its own local services in its initial 35-city area. In other areas, it will interconnect with telephone company lines, but only if they meet certain quality standards.

Turning to the stands . . . one fan club of the specialized carriers should be the makers of communications interconnection equipment, discussed next.

OPPORTUNITIES IN INTERCONNECTION EQUIPMENT

During 1970, independents supplying interconnection gear shipped about $75M worth, of which about $60M was sold outright. At the same time, the telephone companies garnered some $90 million of rental revenues. And the total value of shipments was about $260 million. There are three main equipment categories:

Data sets, or modems. When you check out the picture in modem advertisements, you see a black box that is fantastically the same. Here lies the problem -- technology which is easily available, not much differentiation, and upwards of 80 companies competing. Most users are familiar with only four or five: Western Electric (AT&T), Sylvania (GT&E), Rixon (United Utilities), Milgo, and GE. It's belaboring the obvious to predict a shakeout.

Data sets provide most of Bell's interconnection equipment revenues; it delivered about $175-million's worth last year. The independents shipped about $45M, including acoustic couplers. The carriers will continue to supply end-users with most of their low-speed modems; the independents' best bet for end-user sales are high-speed (higher cost) modems, and they will aim at OEM contracts.

Multiplexers are a big-ticket item that produced $10-$15 million in shipments last year. Shipments will probably grow at about 40% a year, but so far only a few independents have hooked into the end-user market.

Concentrators are another high-priced item, typically based on a minicomputer. In 1970, they accounted for about 7% of the $285 million of dedicated application computer shipments. Mini makers, specialized communications manufacturers, and systems houses will all take a crack at this sector, which should grow at 50%/year.

By the mid-1970s, the new carriers will be a good OEM market for interconnection gear. They don't plan to make their own. They will start by buying low-speed modems, and, later on, more high-speed modems, multiplexers, and concentrators.

Stumbling blocks

The story with communications interface devices is, again, something like the plug-to-plug compatible memory saga. Independents do most of their business with a few large users. The best targets are airlines, time-sharing and other remote

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computing firms, government agencies, universities, and some huge corporations. The giant users have been fairly willing to put in independent equipment.

But as the independents go down the Fortune lists for prospects, they will find it harder and harder to talk the communications expert into trusting the reliability of the equipment and into introducing another vendor onto the site. Especially if the communications expert used to work for AT&T, and a good many did.

Life would be so simple if the independents' only problem was persuading end users. But there are other complexities. One is that their modem market -- OEM and end-user -- may fizzle if computer terminal manufacturers decide to include the data set (by this time not much more than a plug-in card) in the terminal and make it in-house. Eventually, more and more functions of multiplexers and concentrators may also be incorporated into the computer system as well.

A minor source of hassle is AT&T's tariff provisions on interconnection of equipment to its lines. Of course, the big battle for allowing foreign attachments has been won. Bell only sets standards and requires a simple network protection device, the Direct Access Arrangement (DAA), on the switched network. Independent equipment makers consider the DAA unnecessary and a nuisance. Some modem makers are forming an association which will protest a pending AT&T tariff which, starting in August, would require protection for private leased lines as well.

THE REGULATORY GAME: THREE DOWN, TWO TO GO

The Federal Communications Commission actually raised five issues concerning the entry of specialized carriers into communications. It settled the first three and put off decision on the last two. They are summarized in the box, below.

ISSUES RAISED BY SPECIALIZED CARRIER APPLICATIONS

A. Should new carriers be allowed into the specialized communications field? If so,

B. Should the FCC hear claims of "mutual economic exclusivity" by companies applying to build links in specific localities?

C. What rules should the FCC adopt concerning certain technical matters involving interference and use of the frequency spectrum?

D. Should potential customers for the specialized carriers get some kind of protection re quality and reliability of service?

E. What is the appropriate means for local distribution of the new carriers' services?

The Commission's May 25 decision is a significant step toward bringing competition into communications -- an industry which has traditionally been a regulated monopoly, or near-monopoly. Indeed, it's probably the first time public communications in any major country will experience anything resembling competition.

One force which appears to be pushing the idea of more competition for communications is the White House. Significantly, it has been taking more of a lead in proposing policy. Of course, the place where the buck stops is still the FCC.

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How does the two-month-old decision bear out the new spirit? Here are some quotes that give a clue as to the FCC's plans, but some important questions have been explicitly or implicitly ducked. For example, the FCC will tackle costing specialized services only on a case-by-case basis. Also, it has not said whether it would limit overall profits of the new carriers.

Competition. The FCC set forth a general policy that favors the entry of new carriers into specialized communications. And it shot down any idea that these new systems would be any real threat to Bell. The FCC says there is . . .

> . . . no reason whatsoever to assume that the applicants would divert all or even a substantial portion of that comparatively small percentage of existing and projected Bell System business that is vulnerable to competition . . . MCI anticipates only about $55 million in total annual revenues from all the MCI systems covered by applications . . . Datran's proposed plant investment is only about $350 million . . .

. . . compared to AT&T's billions. Indeed, the decision stresses that there will be competition from the old carriers as well as from newcomers.

> Existing and new carriers shall have an opportunity to compete fairly and fully in the sale of specialized services . . . There is no reason to deny the public the benefits that may derive from active and vigorous participation by the Bell System and Western Union in this market . . . Moreover, we subscribe fully to the [views] that there should not be any 'protective umbrella' for the new entrants . . .

Next to the issue of whether new carriers should arise at all, it seems to EDP/IR that one of the most important elements of the decision is how AT&T will be allowed to price its specialized services in competition with new carriers. On that specific question, it looks as if the Bell System won one and tied one. The giant carrier argued that if the FCC was going to insist on authorizing new entry,

> there should be no cross-subsidization or temporary price cuts. However, AT&T should be permitted to depart from its nationwide rate structure where that practice inhibits its ability to compete effectively.

The FCC agreed. But on the question of cost-allocation for purposes of rate-making, the Commission hedged.

AT&T wanted long-run incremental costs to be the criterion; the prospective carriers wanted fully allocated costs. The FCC pointed out that a docket on rate-making principles was pending, and that it would be "premature" to express an opinion now on pricing and costing of monopoly and competitive services." But it said,

> It is our intention to permit the existing carriers to price their competitive services in a fashion that will realistically and reasonably reflect economic advantages, if any, that are inherent in the plant and operations of those carriers.

The other four questions

As to the next two issues, the FCC declined to hear claims by various applicants that (B) only they should be allowed to put up a system in a certain area. The third issue (C) was resolved with specific rulings of frequencies etc.

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The FCC's fourth query (D) is whether potential customers for the new carriers should get some measure of protection in the area of quality and reliability of service. In an earlier notice, quoted in the decision, the FCC proposed that some safeguards be required for all carriers offering private-line or other specialized services. The carrier, for example, would have to make refunds if service failed to meet promised reliability standards. A decision on this was deferred.

Likewise, the question of local facilities for the new carriers (E) won't get an answer right away. New carriers may construct their own, but there is a question as to what types or which microwave frequencies may be used. In any event, the Commission reaffirmed its view that "established carriers . . . should, upon request, permit interconnection or leased channel arrangements on reasonable terms to be negotiated with the new carriers . . . and also afford their customers the option of obtaining local distribution service under reasonable terms . . ."

A passing comment in the decision -- Footnote 41 -- seems to reflect the tone of what the Commission is saying.

> We cannot help but note several curious coincidences. There was once upon a time, almost a century ago, when Western Union was the dominant domestic carrier, and Bell was assaying new entry. It has been asserted that Western Union initially sought to make things difficult for Bell by every means at its disposal. . . .

+ + + + + + + + + + +

IBM PLAYS WITH ITS COMPUTER PRICING AGAIN

Observers began asking if maybe IBM had a computer programmed to restructure its pricing schedules every couple of months. Just as this issue was going to press, IBM announced pricing increases for the majority of its CPUs. Generally, they break down as follows:

- System/3, Model 10 -- Rental and purchase prices for most units in all 12 sub-models are increased 6%.

- System/360, Models 30 - 75 -- Rental for 6 CPUs (the 360/44 is not included) is increased roughly 4%, and maintenance on the same CPUs, if purchased, is increased 20%. Purchase prices are not affected, and the net effect is to increase system rentals by 2%.

- System/370, all models -- Rental and purchases are increased: between 5% and 8% on the 135 and 145, a flat 8% on the larger two. No maintenance increases were announced, and figures supplied by IBM indicate that typical systems will cost 4% to 4.5% more.

The announcement applies to the U.S. only. Purchase increases are effective immediately; rental and maintenance changes go into effect Nov. 1.

Coming as it does very quickly on the heels of purchase price reductions and the option of lower-priced fixed-term leases for major peripherals (EDP/IR June 2, 1971), the move has industry observers and participants -- as well as users -- asking many questions. EDP/IR currently is completing the analysis of a user survey on fixed-term leases, and will present the results of this -- plus an analysis of these latest pricing changes -- in the next issue.

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was that it be able to manipulate documents as well as the top-of-the-line word processors. "Most users spend a majority of their time manipulating documents -- memos, reports, letters, programs and manuals," Rosen said.

FCC RUBBER STAMPS MARKETPLACE REALITIES WITH ITS COMPUTER INQUIRY 2 RULING

The Federal Communications Commission in its second Computer Inquiry has opened the competitive door to all computer-based communications services and on-line terminal equipment. But it reserved the right to keep a close rein on AT&T and GTE by restricting their offerings of "enhanced" or computer-based communications services and terminal equipment to separate subsidiaries. In addition, the two firms will have to tariff transmission facilities for their enhanced services. The transition time for the two carriers is two years.

The FCC's decision (Docket 20828) adds clout to Harvard Professor Anthony Oettinger's term "compunications." For several years, since 1966, the FCC has been struggling with defining a demarcation line between computers and communications and who can offer what to whom. AT&T has been calling end runs around the decree by applying the term "enhanced" services or debating the technical merits of what might be considered offending products.

Actually, the broader issue of what Ma Bell may and may not do is a lot older; the 1956 Consent Decree with the Justice Department, still extant, precludes AT&T from participating in the computer market. It's not clear what will happen regarding the Consent Decree, and the decision takes some wind out of the sails of efforts to rewrite the 1934 Communications Act.

Although there will be some adverse reactions to the ruling -- AT&T is already muttering about going to court to fight the separate subsidiary portion and GTE will likely join in -- the overall industry reaction may well be one of relief after the fine print is available for scrutiny. But at least the rules are known -- even though the lines aren't drawn, and players will be able to plan.

The previous state of affairs was a two edged sword -- just as AT&T was in theory not supposed to offer computer related products, firms expanding from their computer industry scope into communications had to deal with an unfamiliar regulatory world embodied by the FCC. Some parts of the decision:

- All carrier-provided terminal equipment will be deregulated. Thus the Dataspeed 40/4 and the newer 4540 can take off their cloaks and emerge with all their grandeur in the enhanced 3270 terminal market. AT&T, along with its Teletype subsidiary, ranked seventh in the U.S. 3270 market as of year end 1979 with about 3% of the installed U.S. base.

- All carrier provided terminal gear must be unbundled and offered for sale by March, 1982.

- All network services must fit into either basic -- offering voice and data transmission capability -- or enhanced -- combining basic services with computer processing. And only basic transmission services are subject to regulation. Only GTE & AT&T need to have separate subsidiaries for regulated and unregulated activities.

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MULTIPLE TRANSMISSION MEDIA JOIN THRONG PROMOTING INFOTAINMENT SERVICES

"The times they are a changin." . . . Bob Dylan

In case you haven't climbed atop your building's roof and surveyed the panoramic scene lately, there have been some significant changes occurring at a dizzying pace within the last couple of years -- even the last couple of months. The magnitude of the effects of these changes on the pattern of daily life and the economic realm remain to be seen.

One thing is for sure; most of the ingredients necessary for the next quantum leap in Americana are present. (Some examples of previous quantum leaps in EDP/IR's estimation: radio, TV, cheap calculators, and digital watches. Can your six-year-old tell time via the big hand and the little hand? Chances are he can't; he reads the numbers on his Casio watch instead.)

Take the melange of current happenings, stir together with a dose of the 1980s economics including pressure to conserve oil, and conjure out of the witches' brew some fun times ahead. A list of ingredients:

- Improved transmission capacity on satellites, which facilitates ...
- ... Booming cable TV. All cable being installed now has two-way transmission capability. Lots of big boys are in the game such as American Express with Warner, CBS, Ted Turner, Getty Oil and four Hollywood movie companies, as well as others.
- The proliferation of microwave communications gear. Around Boston's Route 128 area, this sprouted up literally this winter.
- Less costly, smaller antenna receivers for satellite transmission.
- Recognition of the importance of information -- already assembled in an understandable form -- ergo the popularity of data base services. Dun & Bradstreet bought National CSS; McGraw-Hill bought Data Resources, Inc.; Chase Manhattan bought Interactive Data Corp.
- The phenomenal growth in desktop and small business computers.
- The forthcoming advent of videodisks, which may well be a catalyst in evolving everyday use of data bases, whether they be the stock table one formerly read in the newspaper, a list of Caesar's campaigns, or an economic index.

Like any boom industry, cable is attracting newcomers with their own variations on a theme. Currently cable goes to subscribers for a fee, and some operate on a pay-as-you-see basis. When the TV signal is carried via satellite, there's the temptation to put up one's own antenna dish and avoid payments to the cable companies. This is, in fact, possible, and an outfit in Massachusetts sells dishes to homes.

The latest would-be participant is a satellite company, Comsat General Corp., which formed a subsidiary, Satellite Television Corp., as its vehicle to pursue satellite-to-home subscription television service. Earlier, Comsat

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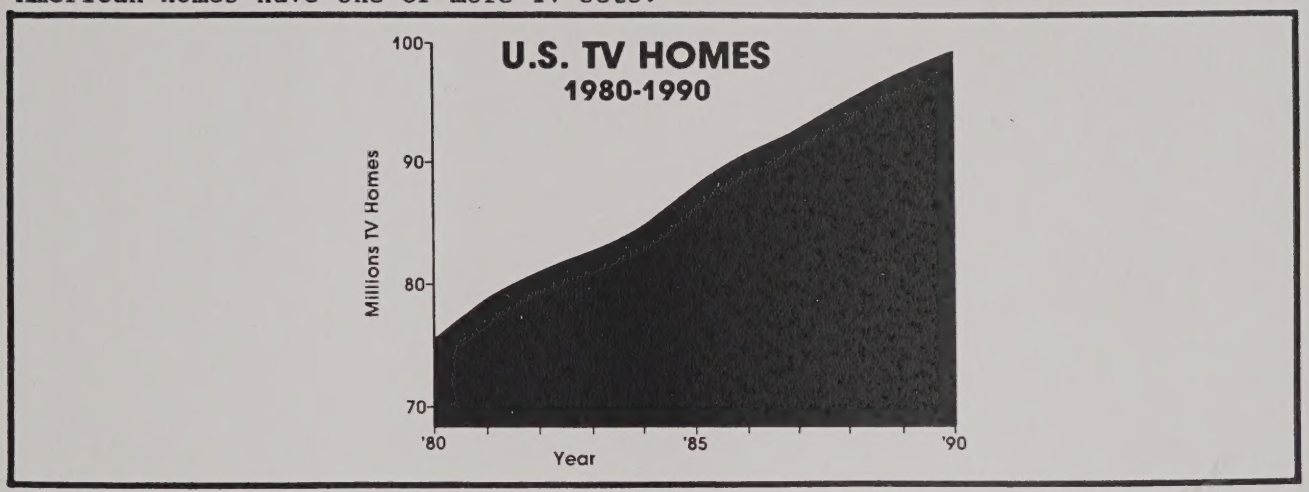
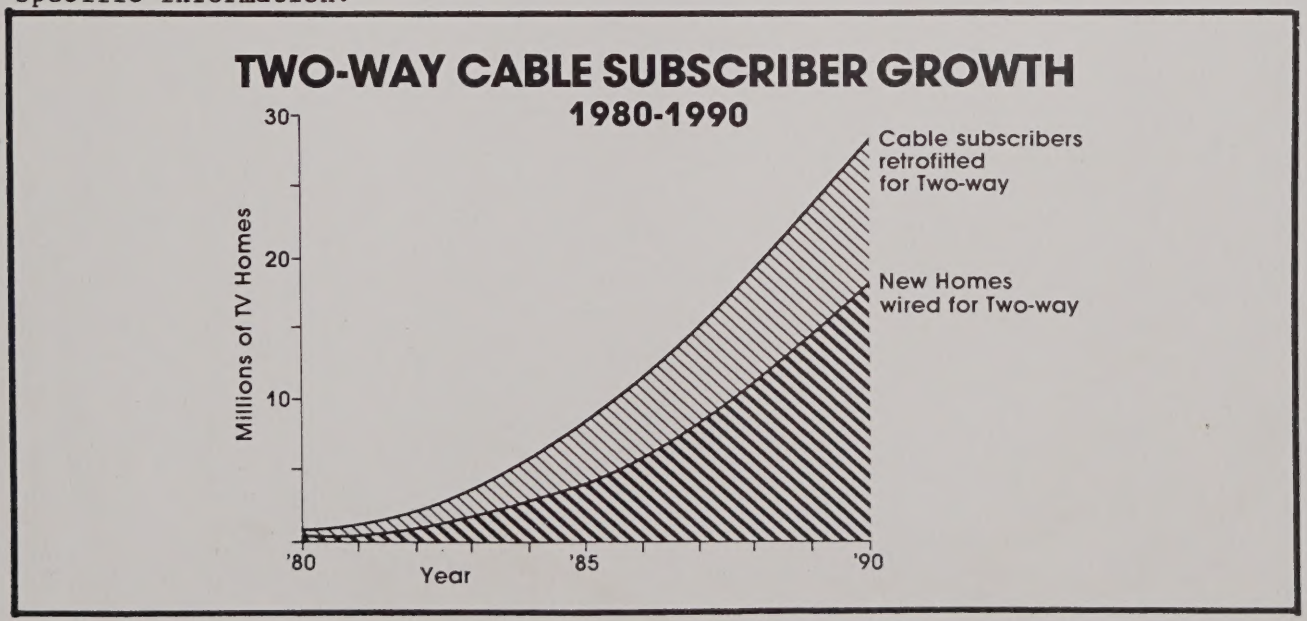
was negotiating with Sears Roebuck for a joint venture, but that fell through and Comsat indicated it is still seeking affiliates.

Much of the key lies in two-way communications capability. While not a new thing to those in the DP world, its ramifications for everyday life could be significant. The ubiquitous TV is moving from a passive sender of preprogrammed scenarios to a means of transmitting to the user specific information requested. In addition, the user becomes transformed from the silent majority to a citizen who can make himself heard, simply by pressing a few buttons linked with the TV and a communications capability, such as cable. The TV is ubiquitous. There are more TV sets in the U.S. than bathtubs. And 98% of American homes have one or more TV sets.



But having a TV set is only part of the answer. Cable TV provides a broadcast medium and now goes to between 15 million and 16 million homes. By the end of 1980, cable subscribers will grow to 19.5 million or 25% of the TV households. And by 1985 half the TV homes in the country will be passed by cable wires, thus offering vast potential for penetration.

But a more important indicator is how many homes will have two-way cable, which not only serves as a broadcast medium but also transmits requests for specific information.



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Thus cable offers at least one method of two-way communications that can be useful when sending to and receiving from a large number of locations.

Qube, now owned by Warner Amex whose parents are Warner Communications and American Express, is one of the more advanced uses of cable's two-way capabilities, and is illustrative of the lure of the potential market. Qube's two-way response capability has been installed in Columbus, Ohio, for some time and is expanding to other communities. With the advent of the Qube III console, the company is expanding its efforts in the information retrieval services including home financial management, teleshopping, security, information retrieval, pay per view programming, and narrowcasting.

The new Qube III console, called the BT-1300, can handle up to 110 program channels and is said to be able to provide "any home service, data information retrieval or video entertainment programming currently available or that may develop in the next decade." The device has 12 interactive response buttons. Pioneer Communications of America, manufacturer, is marketing the terminal to interested cable companies.

For those using Ma Bell, there are different ways of approaching the infotainment market -- the high-priced way, using a desktop computer; and the low-priced way, using a keyboard or keypad and a TV.

Radio Shack is involved with both approaches. Taking the media and the message one step further is Compuserve, a wholly owned subsidiary of H & R Block. Compuserve has:

- A marketing agreement with Tandy Corp.'s Radio Shacks to sell software facilitating access to the Compuserve network and some time on Compuserve. The software, at a top price of about $25, will be available for TRS-80 as well as other popular desktops and dumb terminals. The buyer also receives instructions and an introductory amount of computer time.

- An arrangement to deliver electronically the Columbus (Ohio) Dispatch evening newspaper.

- An agreement with Columbus-based Bank One Corp. to provide on-line credit authorization, verification and processing.

Having Radio Shack sell its software is an exquisite marketing agreement. TRS-80s alone account for nearly 39% of the U.S. desktop base, and certainly Radio Shacks are conveniently located for owners of other desktops.

In pursuing the consumer, Compuserve's information service is said to be designed for ease of use as it is menu driven; Compuserve's other service, Micronet, is used by businesses that need less hand-holding.

Another service company courting this market with data bases compiled on a variety of subjects is The Source, which is accessible via terminals.

And having wowed the world with its marketing of the TRS line, Radio Shack has now stepped down to the more affordable realm of terminals with the screen being the TV set. Called TRS-80 Videotex, the unit attaches to the phone line and the antenna of a TV receiver. Software linking the unit with Compuserve's

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services and a typewriter-like keyboard are included for a price under $430. The Videotex is an outgrowth of Radio Shack's involvement with the U.S. government's Project Green Thumb for farmers. Among the possible applications listed by Radio Shack are airline and rail schedules, electronic banking, classified advertising, news, weather, sports, and stock information.

There are a host of other applications being implemented, and, not surprisingly, AT&T is among the interested parties. AT&T and Knight Ridder have a pact to experiment with a Viewdata trial in Coral Gables, Fla., and AT&T recently had an experiment for directory assistance in Albany, N.Y. Users had display terminals that accessed both white and yellow pages.

Viewdata, Teletext

There are various types of other services that are wending their way toward the consumer and perhaps business markets. Teletext is a one-way method of broadcasting utilizing vertical blanking signals in TV transmission. Viewdata is a two-way scheme that links the telephone and the TV.

Washington, D.C., will be the site of a trial sponsored by several government agencies as well as the Corporation for Public Broadcasting that uses a Canadian system, Telidon. Developed with help from the Canadian government, Telidon has impressive graphics capabilities. The test will be primarily devoted to information retrieval capabilities summoned via a keypad. But users can also transmit information.

Videodisks

Now that the FCC has allowed firms to hook TV sets with keyboards and communications facilities (after much urging by Texas Instruments), the missing link for real use of data bases is an inexpensive storage media. Enter the videodisk. For despite the trumpet-blowing, the fact remains that it is expensive to access computers -- there are communications costs in addition to the CPU or per minute charges. But if one could downline load a selected portion of a data base onto a videodisk and then access it, or manipulate it locally, the costs of using stored digital information would drop dramatically, therefore opening the market still further.

Videodisk prices are expected to be in the range of $500 and the storage capacity is huge -- as much as 1 trillion bytes. Although many of the disks do not now have the capability to write over previously deposited information, their capacity is such that they can still be useful. However, EDP/IR fully believes this is a momentary glitch in the progress of technology and that by the time the market really takes off, videodisks should be able to act like normal data processing disks.

Intracity communication

Currently the communications industry is exploring intracity links. Among the schemes are satellite, cellular radio and cable. Witness Xerox's Xten plan to use cellular radio; SBS, Tymnet and LDC are joining forces in a conglomerate that will use satellite, cellular radio and cable.

Satellite communications seems to be principally suited for large volume transmission from city to city or for use by big companies. Thus a cable TV

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station can throw its broadcast signal up to a satellite, which will then beam it for reception by central locations in other cities. The signal will then go out via terrestrial cable to the locations on its circuit.

Small dish satellite receivers are becoming available and growing in popularity, but their use is likely to be restricted to simple receive-only functions by all but very large businesses because of radio frequency spectrum limitations. These limitations are still very real, although the manufacturers of satellites and receivers are becoming increasingly clever about the clarity of signals, allowing more channels per specific amount of spectrum.

SBS-Tymnet look for local loops

Satellite Business Systems, which plans to launch its bird Oct. 23, 1980, has made some interesting pacts lately. Initially the service was targeted at very large accounts, each of which would have its own earth station, thus no need for local loops. But lately it indicated it is also interested in business from medium-size firms, presumably with some sort of shared earth station arrangement, thus needing local loops to the shared station.

SBS intends to circumvent Ma Bell in this area, and in one fell swoop seeks to expand its realm from the skies to the land. The plan involves, among others, an agreement between SBS and Tymnet and a planned partnership called LDC by Aetna, an SBS parent, and M/A-COM, Inc.

SBS has filed for Federal Communications Commission approval for a demonstration, planned by the end of this year. But there are various parties interested in this; the cable TV industry, the Justice Department and others may become vociferous.

The scheme's simplest part is the transmission of information between New York and San Francisco (SBS). Tymnet would handle the central node in each city, which will be close to the SBS station, and link these nodes with its packet switching network.

The Local Data Distribution (LDD) net, as it is dubbed, intends to use wide band coaxial cable in New York; in San Francisco it would be a two-part system of coaxial cable and specialized radio using the 10 GHz band. Users would have one low-speed port, up to 9,600 bit/sec, and one high-speed port, 56K bit/sec. In each city, a cable TV company would provide connections from its head-end facilities to the LDD nodes.

But there may be more to the agreement than simply local loops:

- SBS probably will have excess capacity on the satellite, and Tymnet might be a willing customer.
- The agreement might herald a more rapid offering by SBS of X.25 compatibility than via IBM.
- Could SBS be affiliating itself, if not wending its way into, the cable TV industry via this agreement?
- The SBS pact provides for experimentation not only with cable but also with cellular radio or microwave.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 16, 1981 • VOL.16,NO.17 P.J. McGOVERN,PUBLISHER

Superminis from HP, HIS -- Page 5

DECADE BEGINS WITH 'DEREGULATION' AS BYWORD; ON OTHER FRONTS, FOCUS SHIFTS TO SOFTWARE

During 1980, the stage was set for the battle of the decade between AT&T and IBM. The budding "deregulation" trend burst into bloom with the Federal Communications Commission's (FCC) Computer Inquiry II decision that gives AT&T the green light for "enhanced" or unregulated offerings as long as they are conducted by a separate entity.

A concommitant result of the decision allows services firms to provide enhanced services without slogging through the mire of paperwork imposed by regulatory status. Thus there should be much more action in the communications/service arena for both observers and participants.

Software, which has progressed through the ages from an unpriced quantity to the primary revenue source for a host of companies, will continue its climb to preeminence and in 1981 should dominate as the most important aspect of the computer industry. Even now, software is becoming evident in different forms including programs and functions embedded in chips. Other trends EDP/IR sees:

- Move toward consumer-oriented marketplace affecting channels of distribution, services, desktops, information appliances, and more concerted thrusts into the home.

- The rate of technological change in the next four or five years will be unparalleled.

- Office automation growth as vendors search for direction; users want cost-effective, integrated, compatible systems.

- Increased emphasis on communications, both in local networks, within a metropolitan area, and intercity. Watch Ma Bell, Satellite Business Systems and Cable TV battle for the home.

- Startup firms have at last found the roads to financing. Investors consider the industry a darling (reminiscent of 1969).

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SIGNS OF MORE TO COME

Among the events that presage trends, EDP/IR suggests these as examples of the '80s kickoff.

- Awareness of the potential of Japanese vendors in the U.S. heightened when: Fujitsu formed a joint venture with TRW that initially will handle point of sale systems but which might be an excellent vehicle for a beachhead in the 370-range of systems; Amdahl fumbled twice in attempted mergers with Memorex and then Storage Technology Corp. (There's widespread suspicion that Fujitsu's presence as an Amdahl shareholder, if not demands, nixed the deals.); Sony announced it intends to span the range of office automation products, commencing with a tiny terminal and a word processing system; NEC is pushing its repriced Astra small business system and garnering more daisy-wheel pacts as in Honeywell's office venture.

- Thought: the Japanese are really going to make hay in the desktop arena. The Hanover Fair was populated with Japanese-made systems, possibly prepping in Europe before making the big plunge in the U.S. Rumors abound of a NEC desktop priced around $800. In desktops, the patterns of distribution and support and rules of the game lend themselves more to the import of Japanese-made systems than do the mini or mainframe arenas. How about a desktop that can be compatible both with Apple and TRS-80?

- Pricing increases were frequent last year -- some companies such as DEC and IBM played the tune twice. Hikes in leasing rates and maintenance were most frequent, reflecting the cost of money and general inflation.

- Services continued to be the bazaar at Mecca attracting acquisition activity, both from within and without the fold. The trend for outsiders to get into the action continued. For example: Schlumberger agreed to acquire Manufacturing Data Systems Inc.; Hyatt Corp. eyed Trans Union Corp.; Readers Digest bought The Source. Those already in the fray include McGraw Hill (DRI); Dun & Bradstreet (NCSS, Donnelly); H&R Block (Compuserve); American Express (Warner-Amex joint venture and First Data Resources).

- Office Automation (OA) superceded Distributed Data Processing (DDP) as the buzzword. But ultimately OA will wind up being part and parcel of the DDP concept. From the top-down approach, integrating DP and other functions: Prime Computer got there first this year with its management and administrative terminals hooked to a Prime 50 Series mini -- with such goodies as tickler files, electronic mail, and appointment scheduling. Honeywell ended the year by announcing its product based on the Level 6. IBM during midyear announced that it eventually will have assorted software products to glue most of its pieces together. Datapoint put its data base retrieval software onto its Arc-based system.

- At the low end, there were a plethora of announcements, but EDP/IR thinks IBM's Displaywriter could be the hottest product by the time IBM and various systems houses fully utilize its 8086 innards.

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Glancing over the potpourri of events that symbolized 1980, EDP/IR herewith presents a brief list of items hopefully of the past:

- Prime rate hit 20% twice during the year, causing close scrutiny of inventory by everyone and special consternation to systems houses.
- Embargo of DP products to the Soviet Union; awareness of the importance of software and embargo of same as well. (ADR's advertisement regarding the arrest of someone attempting to lift its program tapes for delivery in the USSR was an all-time great.)
- Mainframe makers tripped on the path to use of increased density LSI components in a production mode -- Burroughs delayed some shipments and cancelled its big processor; Honeywell abandoned its big CPU with current mode logic (CML) and the industry widely suspected IBM of delaying product introductions because of component fabrication techniques.
- IBM went to the chip market for 16K RAMs and thus helped induce shortages that some others, such as Data General, said created adverse business conditions for them.
- Widely held opinion became documented fact -- Hewlett-Packard testified before a government subcommittee that inspection of incoming Japanese components showed far better quality control than those from U.S. makers. (Quality plus availability helped boost Japanese market share during the year.) Silicon Valley is redoubling its efforts to establish a reputation for quality.

IBM's 3081 "H" introduction probably set the philosophical stage for large mainframes in the near future -- evolution rather than drastic innovation. But there's still a lot of potential untapped power, Big Blue admitted. The world also expects to see some sort of native mode for the 3081.

The rate of technological change in the next four or five years will dwarf that of the past, IDC expects. IBM's thermal conduction modules (TCMs) and their innovations in packaging are significant. Packaging is emerging as the next area of challenge for IC designers.

Taking a global look, Europe appears to be softening, which represents a caution signal to those companies with lots of business there. Japan Inc. seems to be still in the phase of positioning itself for the U.S. market, and is totally committed to IBM compatibility in mainframes, not a bad idea for the remnants of the seven dwarfs to contemplate if they plan to snap much business from IBM.

During 1980, we saw several hardware vendors reprice software; the most notable aspect was IBM's step-by-step removal from the public domain of more of its operating systems. The net result, both for Big Blue and others, is revenue from particular aspects of the operating system. Amdahl already is marketing elements that it claims enhance the performance of IBM systems, and

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other plug compatible vendors, if they want to survive in a world other than 370-compatibility, will have to supply their own operating software elements.

As the focus shifts to a consumer-oriented marketplace, services have a chance to live up to their name and capitalize on providing what the user wants in an easy-to-retrieve form. Outside companies will continue to view the services arena as a vehicle for entry into the information industry.

The rules of the game are changing: customers demand better service, easier to use systems, and increased reliability; at the same time, it's getting more difficult to maintain profit margins with the old ways of distribution and the new layer of support demanded by customers. Witness the burp incurred in the earnings rise of a couple of minicomputer companies during some 1980 periods.

Among the steps vendors are taking to face the issue of how to make a profit with products sporting smaller tickets:

- Support
  + Remote diagnostics
  + Systems engineering by telephone

- Distribution
  + Retail stores -- either exclusive to a company -- DEC, IBM -- or department store approach -- Xerox.
  + Phone orders -- IBM's 3101 terminal
  + Trial period -- IBM's 3101 and color graphics terminal
  + Deciding whether to use distributors or to sell directly to retailers -- Apple and Commodore have both changed their plans during the year; a messy procedure at best.

Communications in picosecond

- Courtroom activity: MCI won an antitrust trial vs. Ma Bell claiming deprivation of access to local loops. An appeal is underway. Ma Bell and the U.S. Justice department were scheduled to go head-to-head in court starting Jan. 15. Any bets the trial will be short-lived?

- Bell is thinking up some pretty fancy phone offerings, along the lines of call-forwarding only more complex. And it is determined to give Cable TV a run for its money in additional home services such as security monitoring, fire alarms and energy conservation. Although many have forgotten about the panacea called Advanced Communications Service (ACS), that too may eventually emerge.

- The term local network is a hot button. Fiber optics shares the glamor with such mundane items as coaxial cable. However, there is coax and coax . . . and broadband coax functions as a captive broadcast spectrum, allowing simultaneous multiple uses. For local nets, there are two schemes awaiting approval from the IEEE -- token passing and the Ethernet-type of collision-avoidance. Given the industry's past successes at initiating standards in advance, probably both techniques will evolve. One IDCer sorts out the various communications types by geographical proximity: building or campus, wherein one doesn't have to link to a carrier; metropolitan area; and intercity.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

DAVID MOSCHELLA, EDITOR JULY 8, 1983 ● V/19, NO. 6 P.J. MCGOVERN, PUBLISHER

U.S. PERSONAL COMPUTER MARKET WILL SURPASS MAINFRAMES BY 1984; DEMOGRAPHICS SEEN AS ONLY MARKET BOUNDARY

"Blitzkrieg -- (lightning war); a war conducted with great speed and force."

How else can the success of the personal computer be described? In 1981, the value of personal computer shipments to the U.S. passed those of terminals; in 1982, small business computers fell; 1983 will leave the mini behind; and by 1984, the once almighty general-purpose market will succumb. Demographic ceilings may now be the only limiting factor, and they are far from being reached.

But more than just creating instant millionaires and exciting new sub-industries, the rise of the personal computer (PC) almost guarantees the information industry's future success. By dramatically expanding the user base, PCs have exponentially increased the material and cerebral resources being focused on the use of information technology. The benefits will surely follow.

The numbers tell the story. International Data Corp., publisher of EDP/IR, estimates that 1982 worldwide shipments of personal computers by U.S. manufacturers reached $5.4 billion, up 77% over 1981. Over the 1983-1987 period, the value of shipments will increase at 38.2% per year, reaching a staggering $27.2 billion by 1987. Thanks to the home market, unit growth will be even higher.

Thus far at least, only standalone word processors and small business computers have been seriously hurt by PC success, but as software improves, terminals and small minis are also feeling the heat. Among the key issues:

- Falling prices. Nearly three million units will be shipped to the U.S. home market in 1983, thanks to price cuts of up to 75% since 1981. Business system prices have held more firmly.

- Open architecture. The success of IBM's MS/DOS-based PC and its open architecture is moving the industry away from the proprietary operating systems of Apple, Tandy and Atari. The standards are also a key to the diverse peripheral options now coming to the market.

- Distribution. Like it or not, shelf space and retailer enthusiasm may be the single most important sales factor. There are over 150 PC vendors and the average retailer carries about five.

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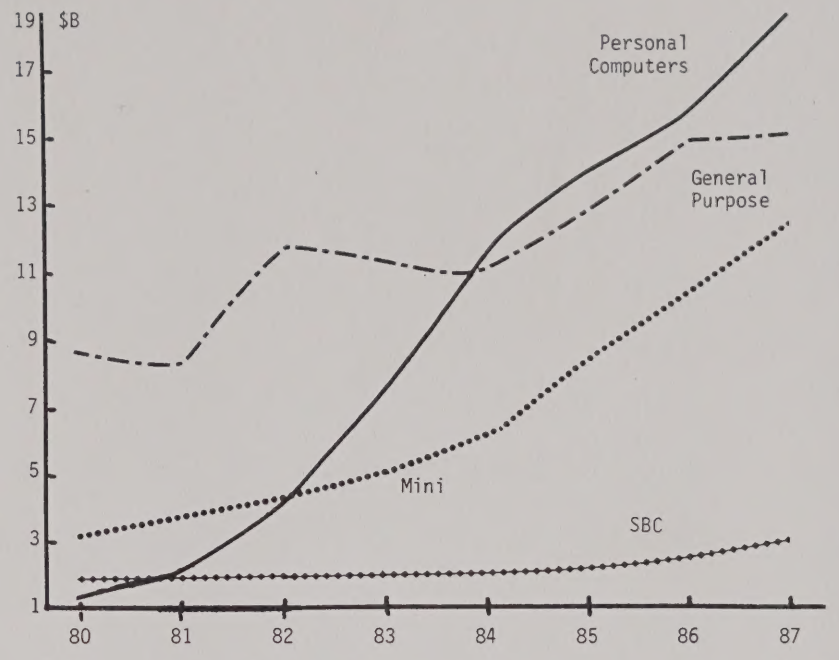
PERSONAL COMPUTERS RISE TO THE TOP; VALUE OF U.S SHIPMENTS, 1978-1987
(Copyright 1983 -- International Data Corporation)

From a manufacturer's standpoint, there is one main caveat to the chart opposite. All the figures used are based on the average retail price of the systems sold. In the case of personal computers, a substantial percentage of the retail price is absorbed by the distribution process, whereas for mainframes, almost all of the revenue accrues to the system builders. Thus, one could still argue that from the manufacturer's point of view, mainframes are still the number one revenue provider.



Market definitions and segmentations

As microprocessor technology becomes the key to systems ranging from $50 to $50,000 dollars, it has become increasingly difficult to view the personal computer market as a nice, neat package. IDC's PC category includes only those machines that are primarily sold as single-user systems. Until this year, IDC used the phrase "desktop computer," but since CPUs that sit on a desk often support multiple users, IDC has now switched to the term "personal computer."

This new definition has led to some slight revisions from the censuses of the past few years. The two most significant are that multi-user micros such as those from Altos and Fortune have been taken out, and single-station processing terminals, like those made by Datapoint and Zentec, have been included. Neither change is large enough to significantly alter the overall summary data.

IDC continues to segment the market into four separate categories -- home, educational, business/professional, and scientific. In terms of the value of U.S. shipments, five-year growth rates are: business/professional, 38.4%; home, 35.1%; scientific, 24.6%; and educational, 18.1%. The corresponding percentages for U.S. unit shipment growth are not significantly different.

Despite the high level of shipments, IDC does not believe that the business/professional market is approaching saturation. Government statistics show that by 1987, there will be some 60 million white collar workers in the U.S., and IDC is projecting a 1987 installed base of some 19 million PCs in the business/professional market. On the home front, IDC expects some 37 million machines to be installed in 1987. There are currently only 80 million U.S. households, suggesting a flattening of home market growth in the 1985-1987 period.

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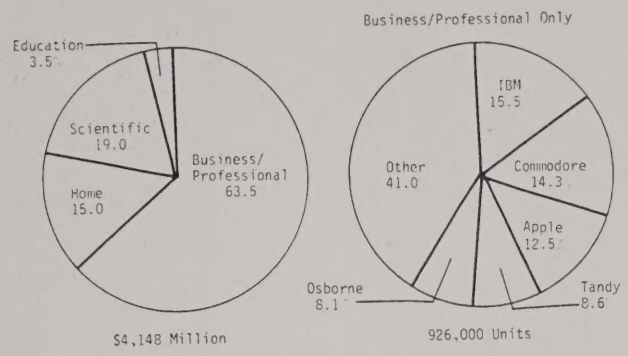
APPLICATION SEGMENTATION, U.S. PERSONAL COMPUTER MARKET
(Copyright 1983 -- International Data Corporation)



IBM jumped way up from just 6% of the market in 1981, and it should increase its lead in 1983 as production continues to ramp up. The business/professional market has been broken out separately because, although the business market is the leader in dollar value, in terms of unit shipments, the home market totally dominates with over 63% of 1982 U.S. shipments.

Because of sharp price/performance increases, the scientific market will remain strong, but vendors such as HP and Tektronix are running into competition from today's powerful 16-bit PCs. The educational market still looks relatively sluggish. There are not enough teachers who know how to use PCs, and interactive courseware is not yet available for most school subjects.

Although some sort of shakeout is inevitable, EDP/IR thinks that the demand for diverse hardware products will make it impossible for a small group of vendors to service the entire industry. Just as motor vehicles run the gamut from mopeds to 18-wheelers, there will be a spectrum of computing options across the $50 to $50,000 range. Given today's market flux, it is unlikely that any handful of vendors will be able to meet the entire market demand anytime soon.

Software patterns

Unlike the balkanized hardware world, personal computer software patterns are starting to take shape. Because of the emphasis on just a few microprocessors (the 68000 and 808X) and operating systems (CP/M, MS/DOS, and Unix), software transportability is becoming more common, and the use of proprietary operating systems for general-purpose PCs is fading. It has become a truism that software sells hardware. Among the key issues:

- User interfaces. Apple's Lisa and recent imitations such as Visicorp.'s VisiOn have emphasized visual aids. In addition, mice have been showing up on everything from executive workstations to CAD/CAM systems. Mouse vendors (featuring names such as Mouse House and Mouse Systems) are reporting very high PC vendor interest as they debate the fine points of digital, mechanical, and even optical mice. Some are already dubbing 1984 as "the year of the mouse."

- Bundling. Integrated applications packages such as on Lisa or Grid's system mark a return to bundled software pricing that could get contagious as multi-tasking options increase software complexity.

- Mini architecture. Honeywell and DEC are bringing mini architecture to the chip level. EDP/IR expects other mini vendors to follow.

- PC/mainframe links. PC access to corporate data has become a hot topic for PC vendors, software houses, service bureaus and MIS groups.

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1982 WORLDWIDE REVENUES TOP 10 INDEPENDENT PC SOFTWARE SUPPLIERS ($M)
(Copyright 1983 -- International Data Corp.)

Vendor	Revenues	Major area	Vendor	Revenues	Major area
VisiCorp	$35	Spreadsheet	Peachtree	$9	Accounting
Microsoft	32	Oper. Systems	Soft. Arts	6	Spreadsheet
MicroPro	26	Word Star	Softech Micro.	5	UCSD-P
Dig. Research	22	Oper. Systems	Info. Unltd.	4.5	Word Proc.
Ashton-Tate	14	DBMS	BPI	4.5	Accounting

Portables ... another rising star

Proving that there is still plenty of room for start-ups, firms such as Osborne, Kaypro, and Compaq have made it big in the portable computer market. Although there is clearly a demand for portable machines, EDP/IR thinks that one of the key reasons for the portable vendor's success thus far has been their low prices, often less than $2,000 for a usable system with software.

IDC breaks this market out into four sectors: handheld; true portables; plug-in portables; and transportables, with the distinctions generally coming down to dimensions, weight, and power supply (see EDP/IR, V/19, #3). Thus far, the action has been dominated by transportables, but true portables are rapidly emerging as evidenced by new products by Gavilan and Sharp. Expect many new products over the next 12 months from new and established vendors alike.

Portables are, of course, giving further impetus to the markets for small, low-cost storage, display and output technologies. Bubbles, cassettes, high-density ROMs, and sub-5.25" floppies are all being used, as is flat panel screen technology. Limited display size is still the market's biggest problem. The emphasis on miniaturization suggests a market for Japanese components.

Portables will also expand the application base. Transportables basically perform the same tasks as their PC brethren, but now a market for smaller specialized devices is rapidly emerging. Tandy's RS-100 is selling well as a word processing or data entry machine, as is a similar product from Epson. Handheld and book-size devices will meet many industry and application-specific needs.

RETAIL DOLLAR VALUE OF 1982 U.S. SHIPMENTS -- TOP 10 PC VENDORS
(Copyright 1983 -- International Data Corporation)

Vendor	1982 $ Millions	1981 $ Millions	%
IBM	836	199	320%
Apple	658	331	99
Commodore	464	96	383
Tandy	379	491	-23
Osborne	179	12	1392
Convergent Tech.	172	23	648
NEC	143	36	297
Hewlett-Packard	135	148	-9
Xerox	99	60	65
Atari	83	44	89
Other	1,000	655	53
Total	4,148	2,095	98

As the data shows, market shares and shipment levels can change dramatically within a single year. The big winners this year were IBM, Commodore, Apple, Osborne, Convergent Technologies and NEC. Among those that fell out of the top 10 in 1982 were Cromemco, Zenith, and Compucorp, while Tandy and HP suffered notable market share losses. Not all retail revenues accrue to the manufacturer.

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Technology trends and impact

Led by microprocessor and Winchester disk technology, the next few years will witness dramatic improvements in PC hardware capabilities. By 1985-86, $5,000 should be able to buy a PC with: 1-4 MIPs processing power, 1-16MB main memory; and 10-400MB of direct access storage. Additionally, support processors for graphics, text, floating point arithmetic and other specialized tasks will greatly enhance workstation capabilities.

Given the forecasted shipments, the increase in installed processing power will be enormous, causing many to conclude that the mini and/or mainframe business will necessarily suffer. EDP/IR believes that until the major vendors start to seriously push local area network technology and until today's mini software is available on PCs, the markets for PCs and minis will remain relatively discrete. As for mainframes, the use of PCs as terminals and manipulators of host data will increase the demand for central resources.

Functionally, there really isn't much difference between networked PCs sharing disk and printer resources, and a typical multi-user small system. It's mostly a matter of where the processing resources are located. The real issues are price/performance and response times. Right now, on a cost basis, a small VAX or Eclipse can compete with PC solutions while offering the advantage of being a proven system supported by a single vendor. But response times vary with application and usage patterns, and here PCs may well have an edge.

In short, EDP/IR believes that the demand for processing power will remain a continuous function over a broad price range. The price/performance of today's minis and small mainframes will increase almost as fast as that of PCs. Depending on application and type of user, the cost trade-offs will vary.

Distribution issues

After several years of squabbling over discount practices and levels of service and support, EDP/IR sees the channels of distribution starting to mature and stabilize. Apple, DEC, Commodore, and Data General are among those who've rethought their distribution strategies, and everyone has realized the importance of advertising and shelf space. IBM's biggest headache has been allocating PCs in a supply constrained environment. Some expected developments:

- OEM business will pick up in the 1984-85 period as PCs start to compete more with minis and as industry-specific markets open up.

- Retail stores will continue to carry a lot of clout with vendors, although vendors are learning to insist on quality retailers who are willing to offer reasonable service and support.

- Large users will buy direct from the vendor to get maximum discounts. Financing schemes have yet to emerge, but since today's PCs are the IBM 360s of their day, volume leasing may be attractive to large organizations, an interesting opportunity for third party lessors.

- Distributors will continue to be a key distribution channel, although their share of the market will decline. Manufacturers will increasingly sell direct to the retailer to cut out the middleman's margin. Distributors are the source of many pricing headaches.

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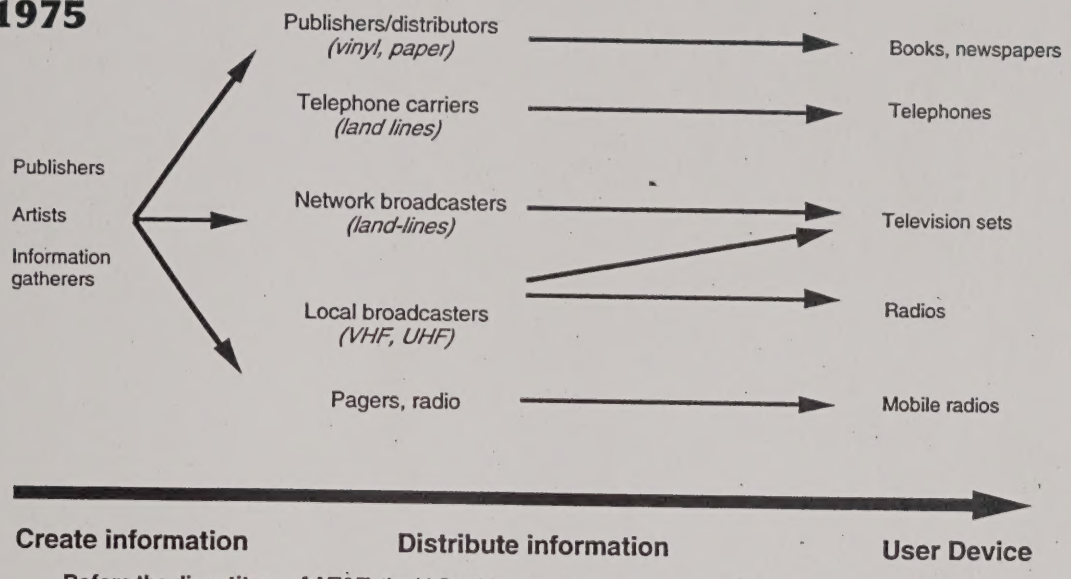
Changes in Creating, Distributing and Displaying Information: Four Views

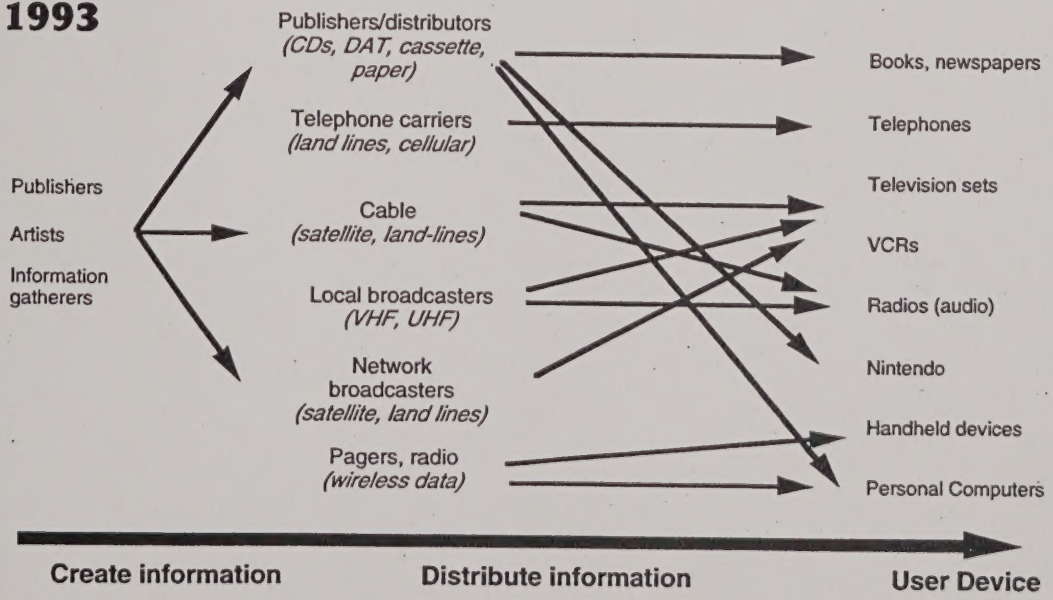
c. 1975



Before the divestiture of AT&T, the U.S. wide-area information communication system was relatively stable. Distinct technologies were developed by companies/institutions that were aligned with distinct or closely-related market opportunities. Carriers and distributors focused on one or two technologies almost exclusively and were single-handedly responsible for making them work by setting and adhering to standards.

Source: IDC, 1993

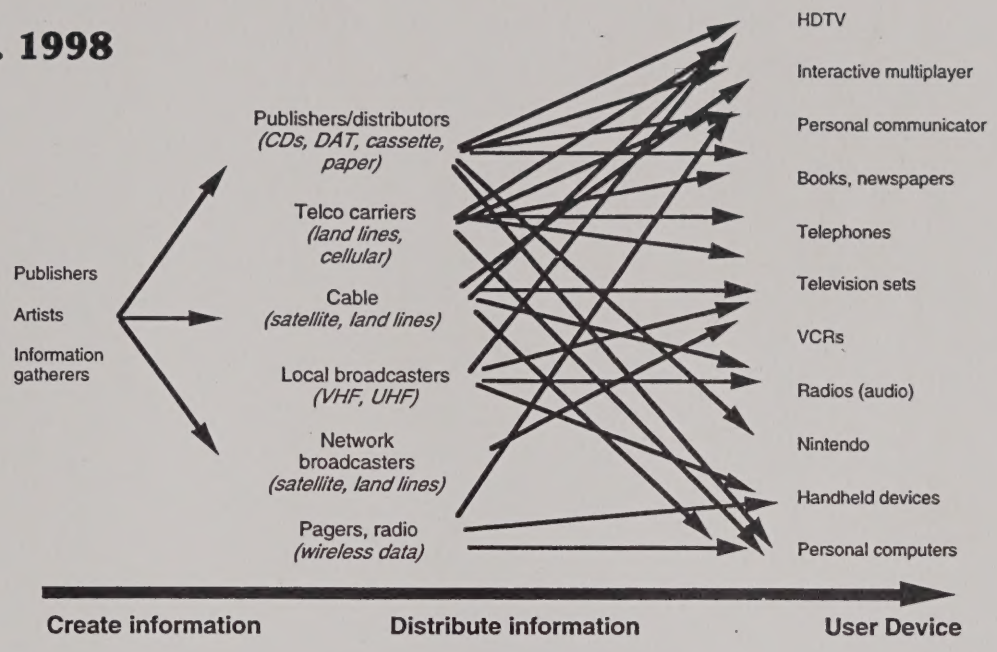
c. 1993



Twenty years later, telecommunication carriers, as well as broadcasters and other carriers (cellular and cable, most notably) have made significant inroads into a broad range of markets, often taking advantage of alternate technologies. Two of the most significant results: intense sparring is taking place between carriers seeking the upper hand for new services, and publishers are finding new delivery schemes for their content.

Source: IDC, 1993

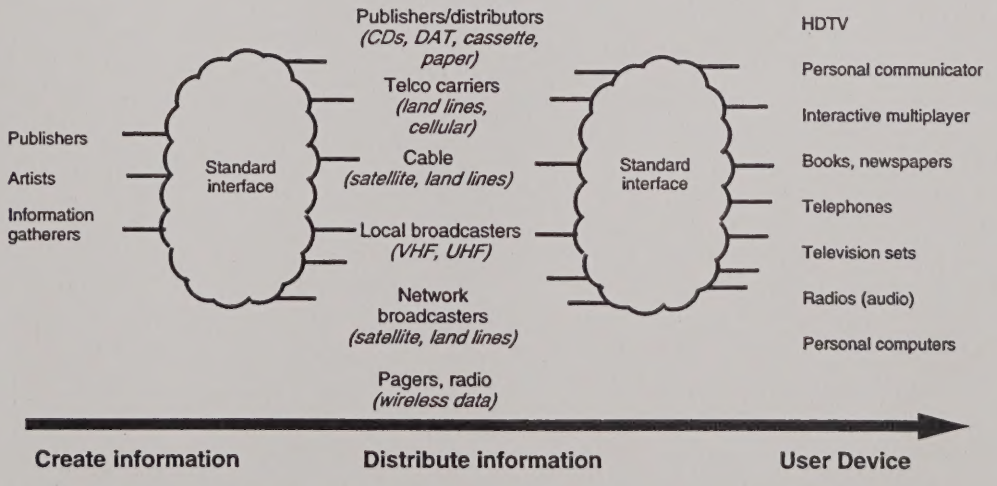
c. 1998



Over the next three to five years competition between all different kinds of carriers will reach a peak. Their primary motive: to position themselves as major infrastructure providers for new high-volume (high-margin?) products: information services, wireless personal networks, broadband individual messaging. To reach the broadest market, publishers will distribute over any technology present.

Source: IDC, 1993

c. 2005



Eventually carriage will become almost entirely technology neutral. Standards between hardware, software, transport and services will mean that neither artists nor end users will know, nor will they care, which medium is transporting their services and information.

Source: IDC, 1993

THE GRAY SHEET
Computer Industry
REPORT

Published continuously since 1964.

The Information Highway — Will You Surf It or Get Pummeled into the Sand?

The Internet — it's everywhere: nightly broadcasts, capitol hill, your daily paper, and the popular news weeklies.

But what's the real (i.e., sans hype) impact of the Internet on IT suppliers today? It is twofold. Business opportunity today and wholly new business paradigms tomorrow. Consider the following:

- An Israeli software company releases a $50 software package to mediate no-cost long-distance telephone calls over the Internet. This means opportunity today, a real long-term threat to the established telecommunication industry.
- Software vendors make new-release updates available to existing customers over the Internet — helping customers today, a long-term alternative to today's software distribution channels.
- Cornell University releases free videoconferencing software — an immediate solution for academic researchers, a long-term alternative to specialized videoconferencing suppliers.
- Dozens of companies (E-cash, Microsoft, NetBill, etc.) race to design the structure of electronic commerce on the net. Their goal is to become the MasterCards, Visas, and transaction clearing houses of the Internet era. Again, revenue today, new model tomorrow.

The Internet represents the most fundamental shift in business practices since the onset of widespread

March 31, 1995 Vol. 30, No. 9

In This Issue

The Information Highway — Will You Surf It or Get Pummeled into the Sand? 1
The Next Wave 2
Stages of Industry Growth 3
The Information Highway — A Value Chain of Opportunities 3
Internet vs. Information Highway 3
Market Drivers: Supply-Side Opportunities in the Value Chain 4
Convergence 4
Migration to New Infrastructure Model, Traditional View 5
The I-Way: Now 5
Cost Sharing of Network Assets 6
Intercorporate Internet — Applications in Use Currently .6
The I-Way: Later 7
Security 7
Sink or Surf 8

The Gray Sheet

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use of credit cards in the 1960s. It has begun to alter the face of commerce radically and reorient the celestial axes by which IT suppliers have traditionally charted their course. In fact, the surfing metaphor is apt; some IT companies will ride the Information Highway wave to profitable new business opportunities, while others will miss the wave and be pummeled into the sand.

How can IT suppliers ride the Infohighway? They need to first understand the flat-earth, round-earth transformation under way. This issue of *The Gray Sheet* analyzes the implications of the great convergence.

The Next Wave

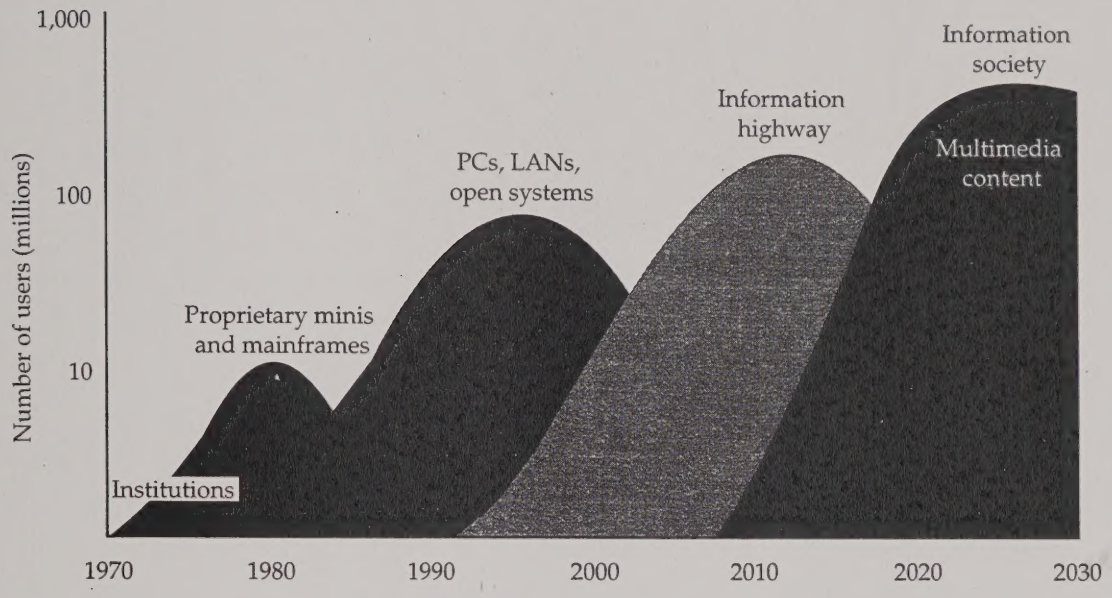
As previously discussed here (see "The I-Way Is No Byway," *The Gray Sheet*, Volume 29, No. 23, 10/28/94), the Information Highway is the next stage in the evolution of the information technology industry. The first stage was based on proprietary minicomputers and mainframes, which were focused on institutions and involved a relatively limited number of information workers — around 10 million worldwide. Peaking in the early 1980s, this first stage has since fallen into a gradual decline; terminal connections should dwindle to inconsequence in about a decade and a half.

We are currently at the apex of the second stage, centered on individuals (nearly 100 million of them), whether in the workplace or the home. The technological center is the personal computer or workstation, either standalone or on a LAN. In a broader sense, this stage has encompassed the entire open-system revolution, which helped shift the economic center of the industry from the hardware manufacturer to the software purchaser — from "the box" to the software that runs on it.

The I-Way is the next great wave of industry expansion and is defined by the pervasive connectivity of both business and consumers. In this stage, everybody gets connected to everybody: businesses get connected to other businesses — both customers and suppliers — consumers get connected to one another and to businesses, and so on. For evidence that this wave is upon us, one need look no further than the explosion in connections to the Internet, the first major manifestation of universal interconnection.

Beyond the I-Way lies the information society, which will be defined by the arrival of truly all-digital multimedia content. The transition to this fourth stage will be as significant as that to the earlier sequences. The difference will be equivalent to the jump from client/server to "wired." Ironically, as we move into the information society stage, the I-Way will disappear. Going forward, the technology of the Information Highway will be no more a part of everyday life than the electric power grid. In this sense, ten years from now to name a magazine *Wired* might sound as odd as naming a magazine *Dial-Tone*.

Stages of Industry Growth



Source: International Data Corporation, 1995

The Information Highway — A Value Chain of Opportunities

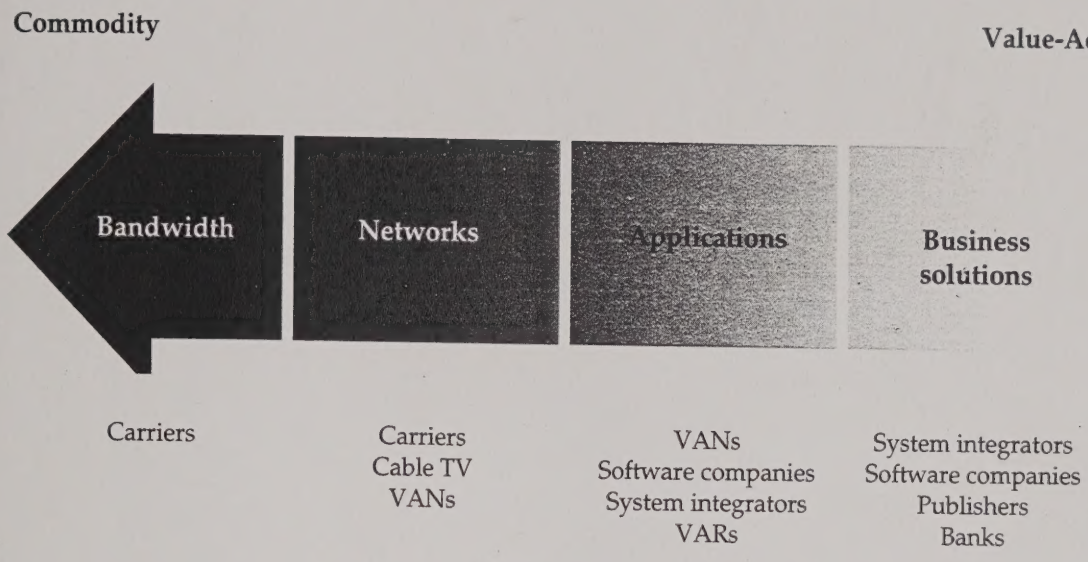
The I-Way will drive growth across the entire IT value chain. At the commodity end of the spectrum, carriers will simply sell bandwidth. Moving toward value-added products and services, the I-Way will drive a host of opportunities. Carriers and cable TV companies will provide networks, software companies and value-added resellers will sell applications, and VARs and publishers will offer business solutions. Where a company positions itself along this spectrum will also determine the amount of competition it can expect. At the commodity end of the value chain, a very small number of large companies will be bandwidth providers.

Meanwhile, at the value-add end of the continuum, a multitude of vendors will offer specific, vertically oriented solutions (like publishers and banks).

Internet vs. Information Highway

The Internet is the current implementation of the Information Highway (I-Way). Whether or not the Internet becomes what we someday consider the I-Way, the I-Way will mirror the Internet's shared and distributed nature. Under this model, each company pays only for its connection to the network, not the network itself. This change in infrastructure is significant. Currently, individual connections are required for different types of con-

Market Drivers: Supply-Side Opportunities in the Value Chain



Source: International Data Corporation, 1995

tent. For example, telephone companies have a network that provides information to telephones and PCs, while TV broadcasters have a separate network that services televisions. Firms in these industries are already blurring the distinction between their networks — cable companies are providing phone service, phone companies are delivering TV programming — but this is only the beginning. The I-Way will be a shared highway serving multiple devices and providing a broadcast medium for many businesses.

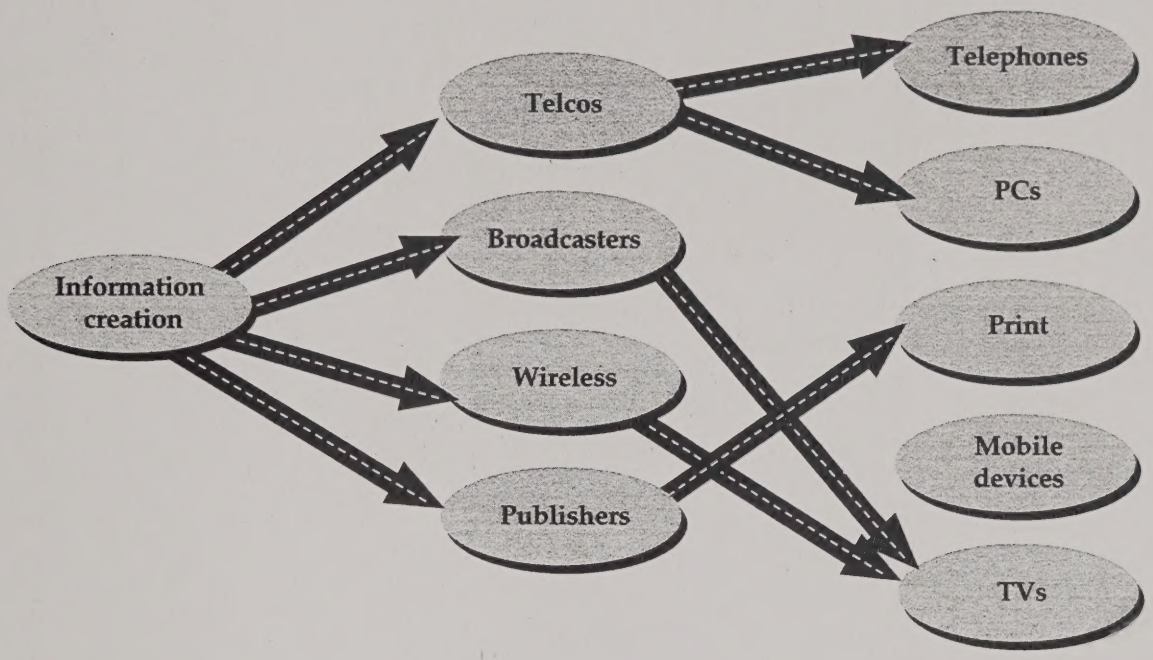
As the current implementation of the Information Highway, the Internet offers many IT companies opportunities to make money and/or save money. For example, how much money would Dell Computer save if customers could enter their own orders using a World Wide Web form? PC buyers savvy enough to know how to do this are not only likely to buy lots of (and/or expensive) systems, but they probably know exactly what they want and find the typical 1-800 sales rep a barrier rather than an aid.

The I-Way, on the other hand, represents a longer-term challenge for firms in the IT market. Although the I-Way offers vast promise, the convergence of markets it will engender also are a formidable threat.

Convergence

As the shared nature of the Information Highway suggests, the I-Way represents a potential paradigm shift for several IT markets. Consider VocalTec's Internet Phone software, which allows one to make a phone call over the Internet using a multimedia PC. Even a high-speed 14.4Kbps modem connection is sufficient for this software to work, providing a half-duplex (only one person can speak at one time), two-way voice connection with another person

Migration to New Infrastructure Model, Traditional View



Source: International Data Corporation, 1995

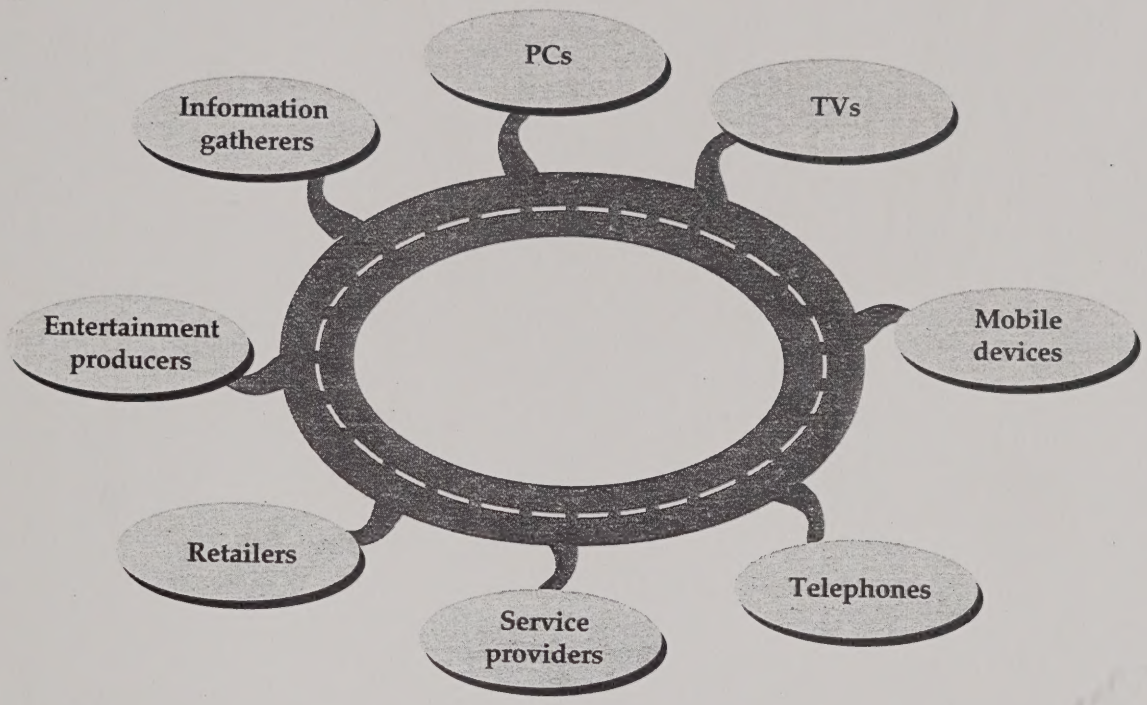
using a similarly equipped PC. Given a local access number for one's Internet connection, such a "phone call" entails no long-distance charges; it makes no difference if the call is to someone next door or on the other side of the planet. If AT&T's greatest strength is its telephone network, what are the implications of technological advances like VocalTec's software? A paradigm shift, plain and simple.

Technological shifts along the lines of Internet Phone change the rules of a market such that existing strengths are no longer relevant; the playing field is leveled and everyone starts from scratch. As a result, the I-Way represents a double-edged sword. On the one hand, the Information Highway offers savvy IT vendors new and exciting market opportunities. On the other hand, IT vendors who ignore the I-Way could be put out of business. Thus, it isn't enough for IT vendors to merely investigate how the I-Way may affect their businesses in a passive fashion. Instead, firms should actively assess its impact and attempt to put themselves out of business. If they don't, someone else might.

The I-Way: Now

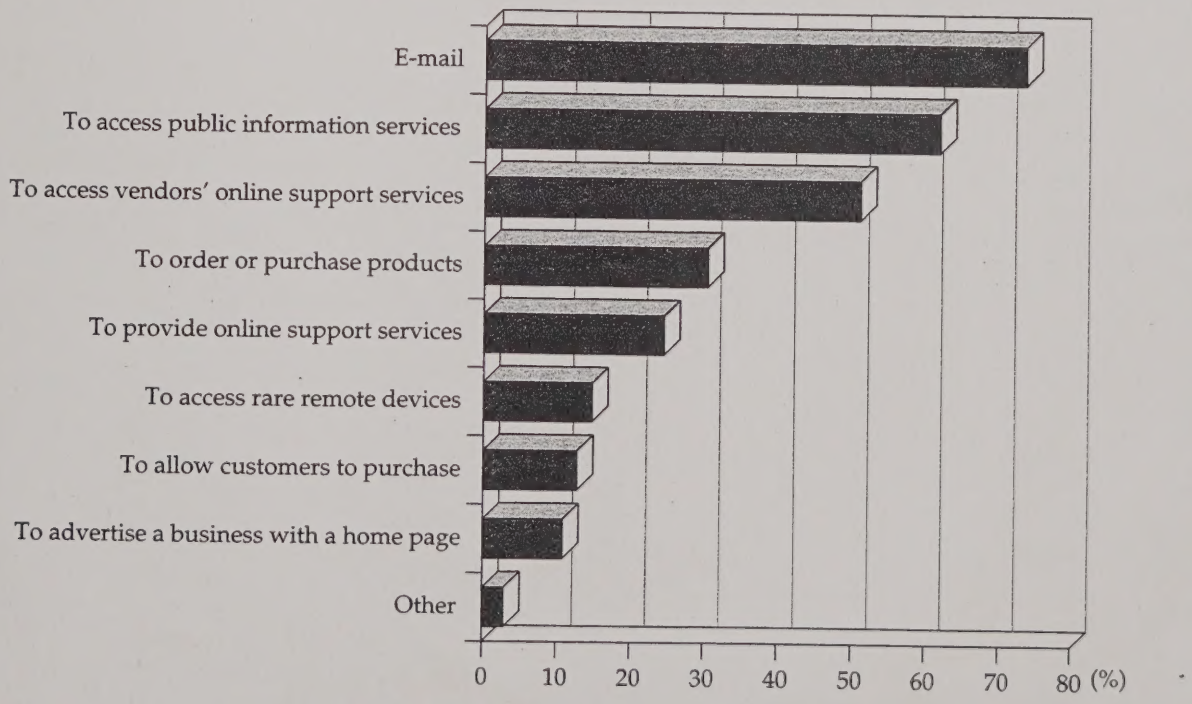
To understand what purposes the I-Way will serve, it is enlightening to examine current Internet use. According to IDC's *1995 Telecom Manager Survey*, the top three Internet applications are e-mail, access to public information services, and access to vendors' online support services. In general, messaging and information retrieval have accounted for most current Internet use; activities related to customer support were viewed as near-term

Cost Sharing of Network Assets



Source: International Data Corporation, 1995

Intercorporate Internet — Applications in Use Currently



Source: IDC's Telecom Manager's Survey, *1995*

applications; and electronic commerce was perceived as a future application.

Although these results are not surprising, they do serve to confirm that most Internet use is for basic stuff. As a result, any near-term focused and Internet-related business strategies should keep this bread-and-butter Internet use in mind — the fancier stuff is a few years away. (Telecom managers, by the way, also intend to use the Internet primarily as an intercompany internetwork. It will not replace existing corporate networks or public data networks.)

The I-Way: Later

Nonetheless, the rate at which new Internet applications are being created and the speed with which the Internet is growing are encouraging. Recent and exciting applications for Internet use include VocalTec's Internet Phone software and Cornell University's CU-SeeMe videoconferencing software (ftp to "ftp://gated.cornell.edu/pub/video/"). Not only are these applications very real examples of convergence enabled by the I-way, they are indications of next-generation I-way market opportunities. On their own, such advancements are impressive. In conjunction with the explosion of Internet adoption, however, these new technologies signal enticing business opportunities.

Security

For the Internet to be a viable place to do business it must become more secure so that transactions are reasonably safe and can confidently transpire. This is not, however, a hurdle that will be cleared once, never to be dealt with again.

Instead, security on the Internet will be an ongoing challenge, a dynamic relationship. As more ingenious methods of enforcing security are discovered, so will increasingly clever ways to foil such measures be found.

In this sense, Internet security is much like physical security in the real world. People are comfortable putting their money in banks because they feel it is safe and, perhaps more important, because they know it is insured. Insurance companies are comfortable insuring banks because they are assured security measures are sufficient to thwart attempted robberies. Bank robberies do occur, however. Insurance companies simply have determined that the chance of a successful robbery occurring is so unlikely that it is an acceptable risk.

With this comparison in mind, people are concerned about security on the Internet for two reasons. The first is that, in general, people feel that the risk is too high — there isn't sufficient security. In other words, at the moment, Internet security is out of synch with physical security in the real world. The second reason has to do with computerized information's efficient and organized nature. Because electronic information can be erased, changed, and/or copied extremely efficiently, once a computer system has been broken into, it can be seriously damaged.

PS — We've Caught the Fever, Too!

Even the esteemed *Gray Sheet* has caught Internet fever. Although it's too early to offer any juicy details, you can expect to find *The Gray Sheet* on the Internet, too. Primarily, our Web site will be for marketing purposes (whose isn't?), but we are thinking of offering periodic tidbits unique to *The Gray Sheet* — online. Stay tuned, and save us a space on your Web browser's hot list.

Sink or Surf

Whether contemplating I-Way–related activities or attempting to assess the impact of the I-Way on their businesses, IT vendors should actively and aggressively investigate I-Way threats and opportunities. After all, the I-Way heralds both the next great wave of IT market evolution and a converging of markets. Short-term and mid-term opportunities open new markets for companies immediately, and they portend major long-term shifts and new business models as well. In short, even if you can't make money on the I-way today, you'd better prepare for tomorrow.

For some firms, separate divisions, skunk works, or even businesses may be appropriate because the I-Way's implications may be politically and culturally too controversial to fully explore internally. Paradigm shifts like those that will be created by the I-Way are difficult enough to spot in one's own industry, let alone address with existing staff and resources. As a result, new staff that is not encumbered by the organization's existing culture may be required. Otherwise, any I-Way effort may be blinded by the company's current vision and/or hamstrung by the firm's existing hierarchy.

As firms actually prepare I-Way–related efforts, they should consider where their product or service falls on the I-Way value chain. One's place on this continuum will not only reaffirm the commodity vs. value-add nature of the product, but the amount and level of competition it will face.

Finally, a firm needs to think about current Internet use and how it relates to its product or service. Despite exciting emerging applications, the bulk of today's Internet use is for bread-and-butter messaging and information-retrieval activities. More sophisticated I-Way applications are undoubtedly coming, but their widespread use is further off than most of us think.

This is not to say that IT vendors shouldn't be preparing for these next-generation I-way opportunities; as previously stated, they absolutely should. Rather, firms should conservatively temper their expectations for the timing of a return on this investment. Would IBM's original PC have been as successful if Don Estridge's group had been on a tight leash with huge and short-term profit expectations? Whereas some markets offer opportunity for short-term revenues, in all there is a much more serious long-term convergence challenge the investigation of which should be viewed as an investment. As IT markets collide on the Information Superhighway, some fatalities are sure to occur.

The Gray Sheet Reflects Along the Way

International Data Corporation

EDP industry report

A1

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 29, 1979 • VOL.15,NO.14,15 P.J.McGOVERN,PUBLISHER

Salute to Data Processing Managers

THE 70S -- DECADE OF THE DP SHOP; DPERS RIDE TECHNOLOGY CURVES, SURVIVE SUPPLIER SHIFTS

As the industry perches on the edge of a decade that many of us have been brought up to believe will be filled with the advent of the Dick Tracy watches and other once "far out" technological goodies -- to say nothing of the infamous year "1984" itself -- perhaps a look back at the 70s will put in perspective those hectic years during which "data processing" became passe and "information processing" became the buzzword.

The DP world has its own chronology of events, some that seem as bizarre as those in the rest of the world. But to fit things into perspective, cast a glance at the 70s in the rest of the world. It was a time when many of the "hippies" from the 60's free speech movement and antiwar rallies donned three piece business suits at computer industry conferences. There was a recession and another dip in the economy. Watergate taught everyone to suspect everyone else, especially those in authority.

More than anything else, the 70s provided the quintessential launching pad for this industry to move into the 80s -- perhaps analogous to the shakedown portion of a cruise into outer space. If one were to label decades -- (and just think, in 20 years we'll see a real, live new millenium) -- perhaps the following would fit the macro trend EDP/IR sees for information processing:

- 70s -- Decade of the DP shop;
- 80s -- Decade of the office;
- 90s -- Decade of the home.

Epitaph -- What can be said of the 70s, also the decade in which technology began to wend its way into the daily life of the masses -- via calculators, microprocessors in home appliances, autos, automatic teller and point of sale machines -- to say nothing of computer-generated bills? Epochal (because we were there); Apochryphal (some of the product announcements); Sad (pioneers still get shot by indians); Happy (when vendors created upgrades that weren't calamitous); Surprising (when semiconductor makers' learning curves became evident in improved price/performance hardware); Litigious.

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Through it all, the DP manager coped -- with slipped software deadlines, manufacturers' promises that didn't quite come true, and with attempts to make management understand DP could play a key role in decision making.

EDP/IR'S LIST OF 70S TRENDS

- 370 and virtual storage; 8100 and 4300 and distributed processing.
- Improved price/performance.
- Deregulation in the communications arena; AT&T's nose under the tent as a supplier of DP gear with the Dataspeed 40 et al.
- Satellites available for widespread use in communications.
- Packet switching with implications for compatibility between CPUs.
- Microprocessors, calculators bringing power to the people.
- Unbundling -- real or apparent?
  + Software as a market; shift to software as revenue source.
- IBM's reactions to independents
  + Lessors, PCMs -- memory, peripherals, CPUs.
- Minicomputer makers' provisions of useable software.
- Antitrust suits vs IBM : The hope Telex gave others.
- IBMs exclusion from the U.S. services industry.
- Increased user loyalty to their mainframe vendor.

IBM gave appearance of reacting

Perhaps the decade can be characterized as that time during which IBM presented the appearance of reacting to the marketplace. (Which is just how defense attorneys for IBM in antitrust cases have written the script.) Very few sectors have not had their turn in the barrel.

Bear in mind when reviewing the 70s that although in many instances IBM appeared to release its grips on something, very often it was simultaneously tightening its vices on another aspect of its product lines. (For example, IBM with the 4300s unbundled part of the operating system, but at the same time integrated the disk controller into the 4331. With the S/38, the data base management system comes as part of the operating system.)

Only just begun is IBM's move to reclaim some of the terminal market that independents handsomely carved out for themselves.

Coming in the 80s . . .

IBM's move to recapture revenues independents have been enjoying through applications software. Rumor has it IBM may be intending to sell its 4300s into new sites as "applications boxes" complete with applications software.

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AN ABBREVIATED CHRONOLOGY OF THE PAST DECADE

- 1970: 370; Computer Inquiry I ended; GE-Honeywell merger; IBM S/7; 3330; IBM into copiers.

- 1971: Exit RCA; data under voice communications announced; MCI operational; IBM's fixed term plan; Afips/Time survey: Americans feel computers affect their lives; Time-sharing thefts; Intel microprocessor.

- 1972: Controversy regarding IBM's limitations of amount of add-on memory; IBM announces virtual storage; Greyhound vs IBM dismissed; Telex files; Numerous user vs. vendor breach of contract suits; Independent peripherals becoming popular.

- 1973: Memorex exits CPU field, files suit vs. IBM; Pitney Bowes exits POS; Southern Pacific Communications Corp. plans nationwide network; General Automation makes false start with silicon on sapphire microprocessor; Federal Trade Commission orders Retail Credit to supply records to individuals concerned; IBM Winchester disk 3340; IBM SDLC protocol announced; AT&T unwraps Dataspeed 40.

- 1974: Energy crunch; Justice files antitrust suit vs AT&T; Floppy disk industry born; Privacy Act of 1974; Datran's network up; Court forces AT&T to interconnect with specialized common carriers.

- 1975: IBM says term "FS" Future Systems is dead; Telex decision overturned; IBM proposes Satellite Business Systems to begin in 1979; Telenet operational; U.S. vs. IBM begins in court; Xerox exits; Amdahl enters with 470 V/6.

- 1976: FCC okays Dataspeed (temporarily); Singer exits POS; distributed processing emerging; IBM unveils SNA, other mainframers their versions; HIS Level 6; IBM S/1; Datran files bankruptcy; Appellate court resurrects Greyhound vs. IBM; Itel markets PCM CPUs; Bell Bill scuttled, Congress to reexamine Communications Act of 1934; Court okays plan to eliminate need for Data Access Arrangements (DAAs) when hooking interconnect gear to public network.

- 1977: CDC, Hitachi in PCM field; IBM moves to protect 3270 mart; IBM gains directed verdict in Calcomp trial; CIA becomes Computer and Communications Industry Association (CCIA); IBM 3033; Small business computer mart heats up.

- 1978: Electronic mail begins to make inroads; HIS 66/85 killed; Digital communications finds new avenues; U.S. completes direct portion of U.S. vs. IBM; Encryption on a chip; Supermini PCMs; Proposed Communications Act of 1978 would override 1956 Consent Decree, thus allowing AT&T to be in DP; IBM okays peer coupling; 8100; AT&T proposes ACS; Word, data processing melding; Services firms offer hardware.

- 1979: IBM 4300; IBM buys 16K RAMs, drying up supply for others; Acquisition mania reaches feverish pitch -- services companies key targets -- many outside firms gaining entry to DP realm; Itel bows out of computer leasing, marketing; Integrated office systems are in; Personal computer makers target small business market.

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RECAP OF THE DECADE'S TRENDS

A recap of the 70s' trends in DP shows some recurring patterns as well as some formation of structures from various blocks -- reminiscent of a child's set that magically is transformed into semblances of castles etc.

(Keep in mind that it was only 1969 when IBM decided to unbundle its product line so that various parts could be procured separately. Previously IBM had bundled prices of training and software in with that of the product. The action was a continuation of a trend begun by the 1956 consent decree mandating IBM to offer products for sale as well as lease. The industry had complained IBM had a stranglehold because of cash required for leasing.)

IBM and plug compatible manufacturers (PCM)

This was the decade when others began to innovate -- in price and/or features. The popular scenario goes that IBM watched this happening, time and again in various sectors -- leasing, memory, peripherals, terminals, and now CPUs. And when the independent sector garnered a certain amount of the market, predetermined by IBM's planners, (see exhibits in any of the antitrust trials vs IBM) the giant swung into action.

- Leasing -- When lessors significantly affected the shape of IBM's earnings curves because of large purchases of first 360s and then 370s, IBM responded with fixed term and extended term plans (FTP and ETP) that diminished the price advantages lessors were offering. Much of this action occurred in the early 70s with several lessors bowing out.

- Memory -- IBM endowed its CPUs and warranted its CPUs for specific amounts of main memory. When independent memory makers decided this was a good market and there really was little reason the CPU could not handle more memory, IBM threatened not to maintain CPUs with more than the IBM-specified amount. After a law suit by Itel in Germany and a suit by Itel and Advanced Memory Systems here, IBM suddenly decided to support these CPUs. IBM continued to support a generous price umbrella for memory until it became nearly unconscionable in terms of the profits it must have been making off of its 2K chips. Usually spearheaded by its General Systems Division, the giant passed on many benefits of its memory "learning curve," dropping the price fairly steadily after 1975.

- Peripherals -- The subject of several antitrust lawsuits. The most blatent and controversial move by IBM was its "introduction" of its 2319A and B disk drives, one of which had an integrated controller, priced to combat the independents' versions of its 2314 drive. During 1970, independents had doubled their installed base of tape and disk systems, and this apparently taxed IBM's forebearance. IDC figured the independents by yearend 1970 had garnered the following shares of the domestic markets: 11% of the 360-compatible tape drive mart; 13% of the 2311 disk mart and 3% of the fast-growing 2314 mart. But the pattern was set: integrate a controller and perhaps raise prices elsewhere to compensate. Interesting today that the 4331 needs no controller for the 3310 or 3370 disks and the latest 8140's disk unit fits in the CPU box.

- Terminals -- for some reason IBM hasn't been quick to act here, in this fast growing market. Independents for some time have been having a

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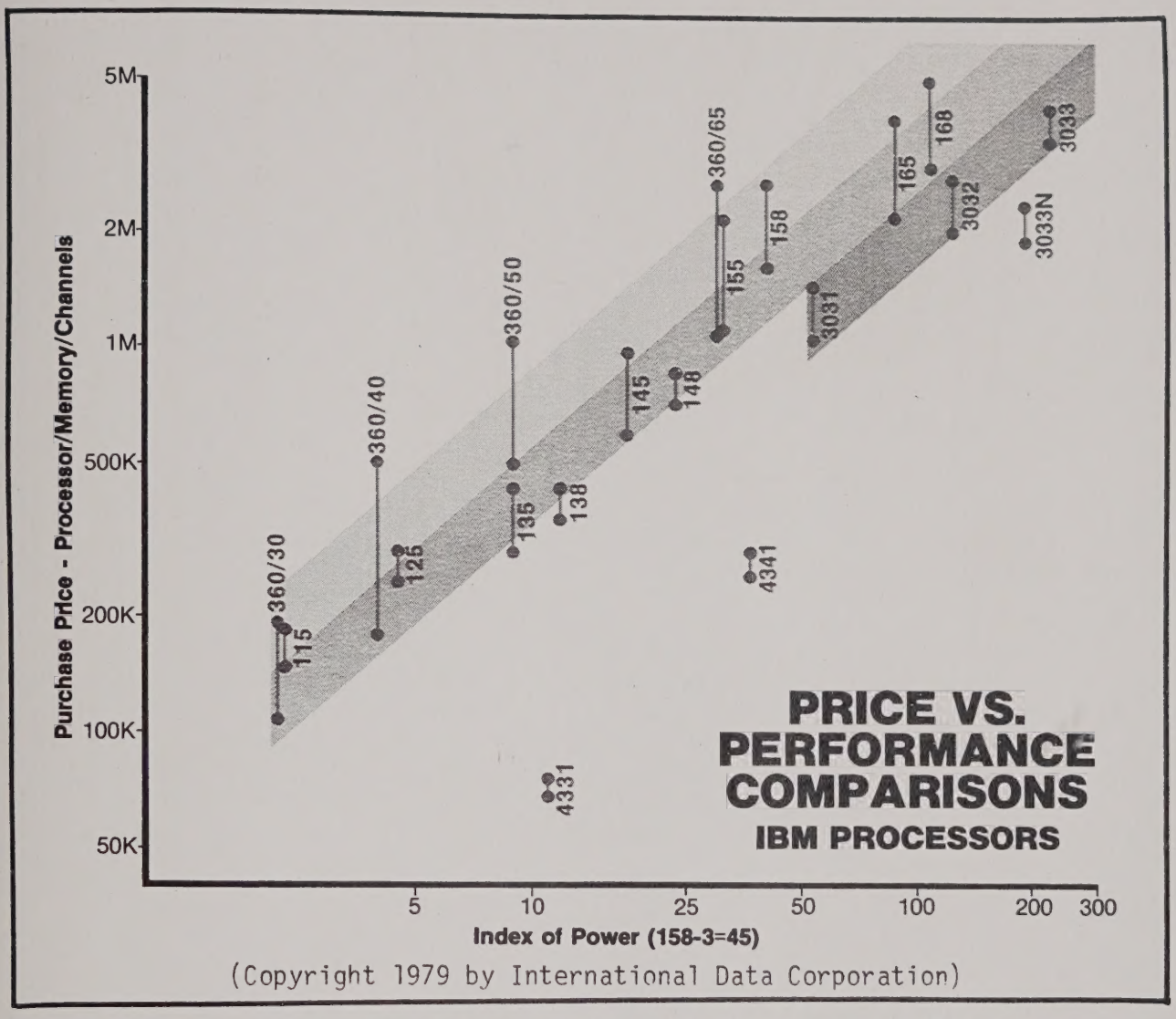

(Copyright 1979 by International Data Corporation)

The above chart depicts the magnitude of the hardware price/performance improvements in the IBM 4300s compared with the 370 line.

The improvement is even more dramatic if one looks at the initial announcement prices of some 370s compared with the 4300s although software can be a significant factor. EDP/IR cautions that these figures consider only hardware purchase costs, and exclude software, (there was more unbundling with the 4300s) and maintenance costs, for which a new pricing structure was announced. IDC rates the power of the 4331 vs the 370/138 as 11.0 and 11.7 respectively, while the 4341 vs the 370/158 is 37 and 41.

ORIGINAL PURCHASE PRICES
Of CPU, Power Supply, Console

4331, 1M	$ 72,500	4341, 2M	$ 245,000
138, 1M	$435,000	158, 2M	$1,370,200

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hayday putting more function into their versions of 3270-compatible devices. Finally in 1977, IBM took notice and came out with lower-price versions of the 3270 family. But in the meanwhile, independents had managed to ship 20% of all 3270-type terminals in the U.S. It wasn't until 1979 that IBM came out with a relatively dumb Ascii terminal, which it is selling via a WATS line and servicing only on a "bring it in and we'll replace it" basis.

- CPUs -- It all began with the fact that the 360's operating system is in the public domain, ergo most of the 370 systems software is unprotected, as well. Memorex was the first to venture into this arena with its MRX-40, whose designer later could be found running a small bookstore in a remote part of Montana. The system works well, according to reports, but there was a definite tentativeness on the part of Memorex when it introduced its baby, thus the parent swiftly let the axe fall. (Memorex's key creditor Bank of America wasn't any too happy about the lumps Memorex was getting from IBM in its peripheral areas.)

  Gene Amdahl, designer of the 360, picked up the ball after getting financing in large part from none other than Fujitsu (when he had exhausted his source at Heiser) and headed for the open fields of large systems with the 470 V/6 in 1975. Next came Itel with its systems from Hitachi and eventually National Semiconductor, while Control Data Corp. came in with its version designed by IPL. And then the crowd. With powerful semiconductors, it didn't prove to be much of a trick to make boxes, and such firms as Magnuson and Two Pi Corp. were born, and others such as Citel and Nanodata almost entered. IBM realized it was being generous with its price umbrella and upped its price/performance ratio with its 4300s and also lowered the prices of its 370s, thus sending some of these suppliers into a rethink mode while the users pondered the move. Itel, facing skeptical bankers, decided to exit the business in 1979.

  How much did the PCMs affect IBM's business? In 1978, the value of PCM shipments, including peripherals, exceeded that of any one of the mainframers excluding IBM. And since there is little trend to switch vendors, most of these sites came out of IBM's hide, possibly robbing it of potential additions or upgrades as well.

Software

Two events and three trends mark the decade concerning software. The events are: unbundling and the use of virtual storage by IBM, which indicated VS was an accepted concept (Burroughs, ICL, RCA had it first). Trends include: increasing substitution of memory (now cheap) so software doesn't have to be fine tuned (expensive); the growing popularity of data bases and software to handle them; and the effort to make computers easy to use.

The software industry came alive with unbundling. Initially vendors concentrated on the IBM base, but with minis and their software shortcomings, the independents expanded. The effects of unbundling are still being felt, as IBM continues to move toward unbundling its operating system. With the 4300, users can purchase part instead of all of the System Installation Productivity Option/Extended, which is associated with the DOS/VSE operating system. Applied Data Research already has a product that is a replacement -- a new

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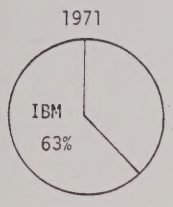
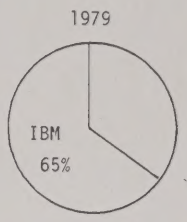
IBM'S SLICE OF THE WORLDWIDE INSTALLED BASE
(Copyright 1979 by International Data Corporation)

Although looking at the number of systems installed gives only part of the picture, one can see the proliferation of computers over the years, especially outside of the general purpose category. These charts were compiled from IDC census figures as of January 1 in the years indicated.

GENERAL PURPOSE

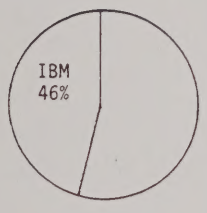


78,255 units

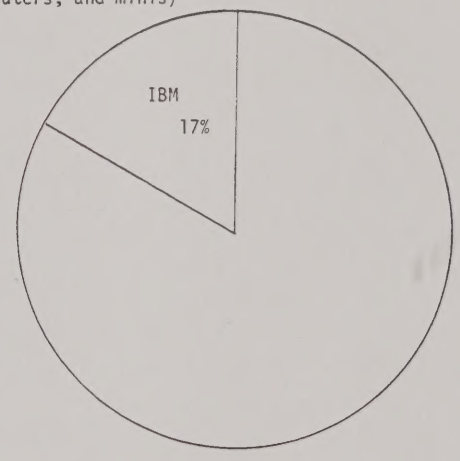


113,124 units
1979

GENERAL PURPOSE AND OTHERS
(Includes desktop, small business computers, and minis)

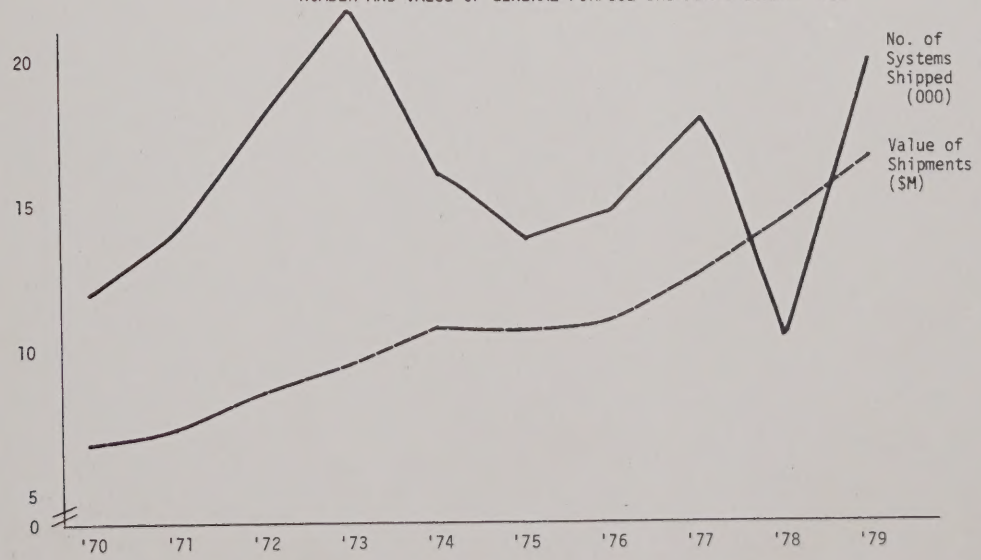


121,751 units



869,935 units

NUMBER AND VALUE OF GENERAL PURPOSE SHIPMENTS DURING '70S



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version of its "Vollie" -- for part of the VSE/ICCF which is the on-line program development system.

Although the principle that one can select parts from various sources is attractive, examine IBM's motives for further unbundling. As revenues from hardware decline as costs decline (and competition exists) IBM is forced to look for alternative sources of cash for its coffers. Software offers an excellent means. IBM isn't always an altruist.

(While the hardware fans rave over improved price/productivity of the 4300 boxes, the jury is still out on how cost effective the systems are considering the increased costs of software -- one now pays for parts of communications software that previously were included in the program pricetag, for instance. And maintenance costs are going up as well.)

And software, or more appropriately microcode, offers IBM and any other mainframe maker the option of making changes or upgrades that could send the competition back to the drawing boards.

In the future, IBM will use microcode as a means of outdistancing and keeping off balance all the would-be PCMers. What IBM giveth, in terms of apparent opportunities resulting from unbundling, IBM can also taketh away.

A look at the independent software market (excluding all hardware vendors' revenues) shows the bulk of the revenues is in the applications area, although some independent system software packages get wide popularity -- Cincom's Total is running neck and neck with IBM's IMS for the number of installations.

The independent software market reached $670 million by yearend 1978 and nearly half was in the application arena. IDC projects software sales in 1983 will reach $2.3 billion, with applications again accounting for half.

Deregulation and blending of computer and communications technologies

The 70s merit the term fantabulous. The 80s will be supercallifragilisticexpialidotious. All roads lead first to the office and then to the home, after the spadework done in the 70s. From the Carterphone decision in 1969 which opened the door for independents to supply modems to devices hooked into AT&T's net, the movement has snowballed in scope and pace. Firms in other industries are doing their best to pick up a stake -- Dun and Bradstreet bought National CSS, American Express picked up part of Warner's Cable TV unit -- and industry members are solidifying their positions -- GTE bought Telenet.

Some key points that illustrate the scope of the deregulation movement and its implications on competition:

- AT&T -- The Federal Communications Commission (FCC) is bent on competition -- which in its books means letting AT&T offer competitive services. (Those Dataspeed 40s aren't dumb terminals, you know.) This will continue to happen regardless of how long it takes Congress to do away with the 1956 Consent Decree that prohibits AT&T from participating in the computer industry. How does the FCC do this? It grants AT&T a "temporary" OK. Obviously, once volume shipments start, how is it ever going to make AT&T exit that market? Although AT&T is revising its accounting into a uniform system of accounts, the revision is a slow and

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painful process . . . and competitors aren't convinced that AT&T's scheme will be what the industry wants to police and prevent the possibility of cross subsidy of competitive offerings with the coins reaped in AT&T's monopolistic ventures.

- Consumers have choices -- in phones, PBXs, use of specialized common carriers, modems, line monitors. (The specialized common carriers' battles to get AT&T to provide them local loops reads like a soap opera of the "haves and have nots.") Although these markets are tiny compared with AT&T, their very existence is significant.

- Integration in reverse. What's fair is fair, and it hasn't taken the computer companies long to realize they'd like to play in AT&T's backyard. Most are starting in the big blue sky with satellites -- either with their own or renting capacity. IBM's Satellite Business Systems, Xerox's Xten are examples of proposed schemes to provide end to end transportation of data without depending on Ma Bell even for local loops. It's no secret that hardware costs are declining far faster than communications costs. And it's also true that the elasticity of the communications market has not begun to be examined. Thus hardware makers in search of future revenues are eyeing the integration or at least interconnection of computer and communications facilities. (Note IBM's new modems announced last summer.)

- New ways of transmitting digital data. For starters, there was data under voice from AT&T, a method of using one circuit for both. And Digital Broadcasting Corp. has devised a scheme for using FM radio frequencies to transmit data. Not to be overlooked are cable TV, microwave, and short wave mobile radio. The FCC is letting some phone companies in remote places also own CATV stations. And yes, there's also a means of transmitting data between the bands of signals received on an ordinary TV. The wired society is indeed coming -- and fast.

- Packet switching is probably one of the most significant happenings of the 70s. Believe it or not, something close to a standard X.25 was adopted before too many people had too much at stake. The use of X.25 could pave the way for compatibility among computers. After all, Telenet (a descendant of Arpanet) has figured out ways to decode and render compatible data from various types of CPUs, thanks to smarts at both ends of its X.25 system.

Indeed, life was simpler at the beginning of the decade. There were mainframes and there were minis. Now, there is nearly total integration of manufacturers into various lines, and much interchangeability of one type of CPU for another. For instance, ask any of the supermini makers where they are selling a hefty proportion of their product and the answer is to offload mainframes, which delays the date of mainframe upgrading. Thus it can be argued that these minimakers are indeed pirating revenues that formerly would have belonged solely to the mainframers. At the same time, look at the number of mainframers that have recognized the virtues of being in the minicomputer market. Univac bought Varian, IBM brought out the Series/1, Honeywell is using its Level 6 to good advantage, even Control Data announced a mini. That leaves Burroughs as the nonconformist. But Burroughs has been aggressively pursuing the small business market with a system marketed with more bells and whistles than a mini.

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Just as we have minis infringing on mainframers' turf, we now have microprocessor systems taking over jobs once the province of minis. And the guts of nearly any modern system are either exclusively or mostly a bunch of microprocessors. The implications of micros on system architecture are far reaching, to say the least, with distributed intelligence the way of the future. As just one example, take a good look at the IBM 4300 -- especially the 3880 controller. The intelligence is getting closer to peripherals all the time.

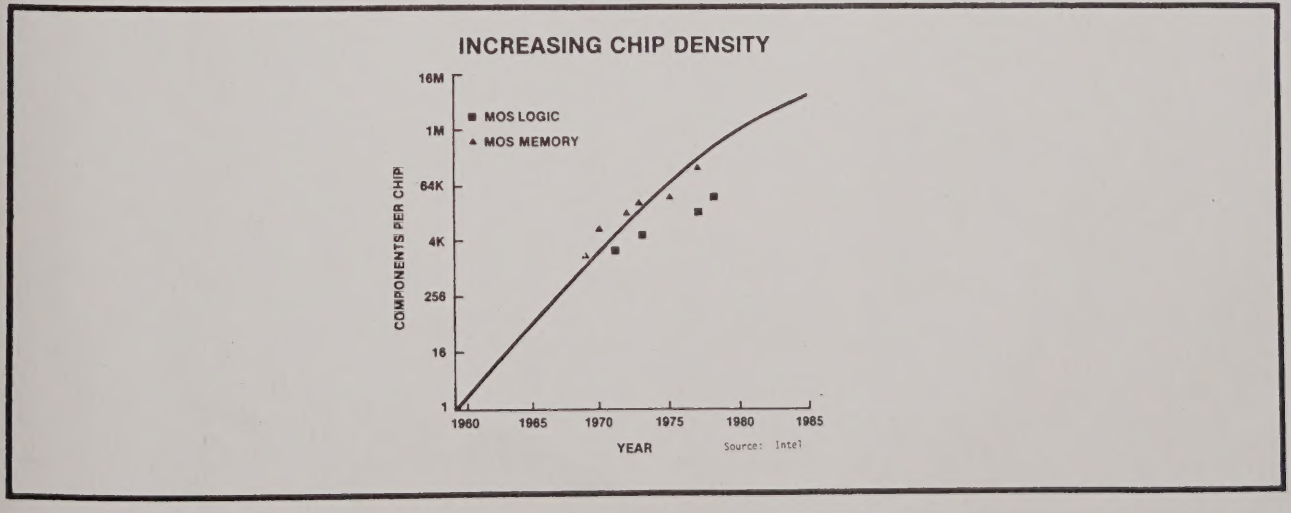
Semiconductors lead the way

Ever wonder what life would be like in the industry if Gordon Moore and his cohorts in the semiconductor industry weren't engineers, or if they listened to marketers from the mainstream of the industry? Either the industry was very competitive during its formative years or no one told the semi makers about pricing according to what the market will bear -- or that a built-in profit margin might be helpful when dealing with distributors.

The fact remains -- the pricing curve in the semiconductor industry has shown a very steep downward slope as fabricating techniques improve volume yields and the makers pass along their savings.

Observers/participants from the general purpose computer arena and from the semiconductor arena speak of maxims pertaining to price/performance improvement. Herb Grosch's law "the economy is as the square root of speed" is translated into "if you want to do something twice as cheap it's got to be four times as fast." Gordon Moore, chief honcho of Intel, observed back in 1964 that the "integrated circuits would continue to double in complexity every year." And the more that's packed on a chip, the closer everything is, the less distance for signals to travel, the faster the device. Some indication of the improvements from the semiconductor industry can be seen from the graphs below.

But just as the semiconductor industry has benefitted and pushed the computer industry into new heights of achievement and new dimensions of compactness, the flip side of the coin is that the industry has become dependent on the silicon valley suppliers. Witness the current situation with IBM ordering large quantities of 16K RAMs from various suppliers, thus drying up the supply available to others. (One minimaker characterized the move as a cheap way of hobbling the rest of the industry.)



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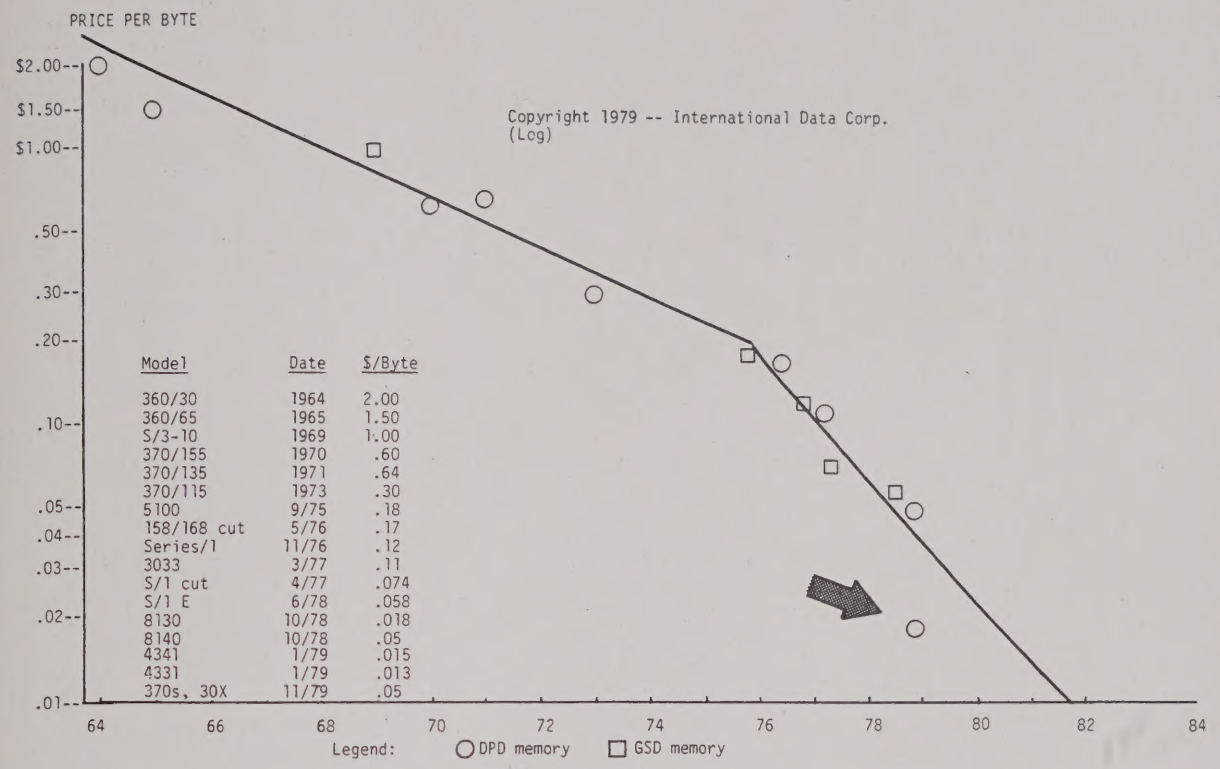
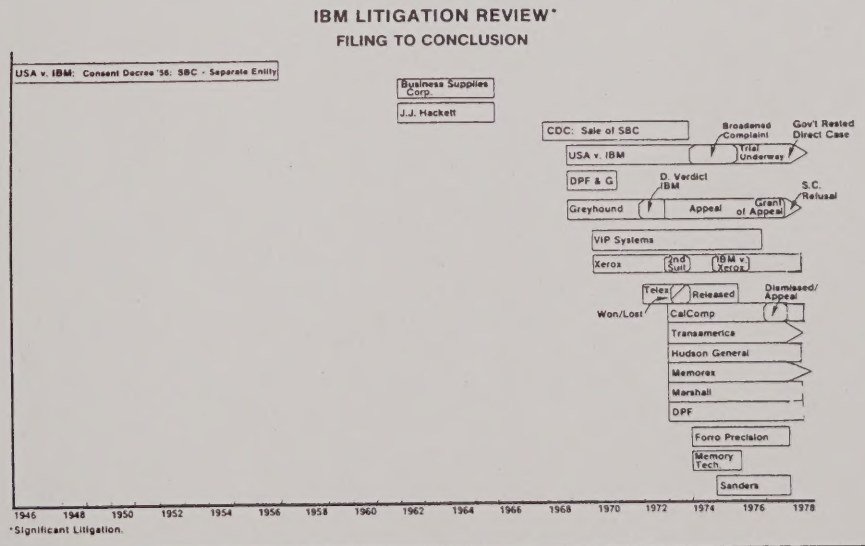
IBM'S MEMORY PRICES OVER TIME
(Copyright 1979 by International Data Corporation)



Model	Date	$/Byte
360/30	1964	2.00
360/65	1965	1.50
S/3-10	1969	1.00
370/155	1970	.60
370/135	1971	.64
370/115	1973	.30
5100	9/75	.18
158/168 cut	5/76	.17
Series/1	11/76	.12
3033	3/77	.11
S/1 cut	4/77	.074
S/1 E	6/78	.058
8130	10/78	.018
8140	10/78	.05
4341	1/79	.015
4331	1/79	.013
370s, 30X	11/79	.05

LITIGIOUS DECADE -- ANTITRUST SUITS VS IBM



The remaining suits are those by the Justice Department, Greyhound, and Memorex. Transamerica plans to appeal Judge Schnacke's ruling, after the jury was hung, that Transamerica didn't have a case. IBM has compiled a formidable track record in defending itself. Of the recent suits, The Ninth Circuit Court of Appeals refused to overturn the original directed verdict in the Calcomp case. Memorex also received a directed verdict and has appealed.

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On to the future!

The future is the home. One pundit observed that we're about to enter the networking age -- with the same widespread ramifications as the iron age or the industrial age. Although some see the 80s being the age of the office, one cannot help but think about the home.

Many of the props and motivating forces are in place:

- Energy crunch regarding transportation;
- Deregulation in the communications area inviting innovation;
- Sociology may be ready for the age of the home infotainment.

Although some experiments a few years ago bombed on such aspects as grocery shopping via terminals, look at the changing life style in the U.S. Working women do not covet going to the supermarket as do their housewifely predecessors. EDP/IR sees acceptance of remote services to the home as a lot closer in time than many think.

But there are many ways of creating two-way communication with the home now, and many of them don't require cable TV wiring. Obviously the phone companies are in a prime position here. Of course Ma Bell bears watching. One of her offspring in New York state has an experimental two-way system in operation. One needed item not yet in place is a very inexpensive storage device -- and EDP/IR is a strong proponent of the videodisk that will wend its way into the home via the entertainment budget. When one can downline load selected portions of databases compiled by services firms, the "info" part of the field should begin to take off. Right now using a terminal on an interactive basis is an expensive way of living -- but if the data can be quickly downline loaded, ready for local access, then it becomes economical.

The gating factor during the 80s will be legislation/regulation, not technology, as was the case in the 70s.

Looking to 1980 -- here are some gazes in the usual hazy crystal ball:

- IBM unveils a new series -- It might be code-named M instead of H -- and IBM might even follow tradition and name it the 380. Towards the very end of the year, IBM could unveil the real meat of the 4300, just as VS in 370s came after the initial announcements.
- No mainframers will drop out of the business, although there could be some shakeout among the PCMers.
- Continuing consolidation of the ranks of the minicomputer makers -- either through mergers within the industry or more likely acquisitions by companies from outside the industry.
- Exxon and others of its ilk will be looking for companies with nationwide networks -- Tymshare may be a likely target.
- Year of the specialized processor. The most noticeable will be the database processor, which might get hatched by the Intel/MRI team.

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IDC'S LONG RANGE TECHNOLOGY FORECAST VIA "DELPHI" SURVEY TECHNIQUE
(EDP/IR, 1976)

1980

- 16K RAMS as bulk of memory shipments
  - Facsimile under 15sec/page
  - IBM-U.S. suit resolved
    - Nonimpact typewriters widely available
      - Bubble memories in commercial terminals

1985

- Computer with S/32 power available under $1,000
- 1MB microsecond access memory under $1,000
- Fiber optics for short distance communications
- Image capture systems begin to replace OCR/MICR
- Hand-held matrix printers widely available
- CPU with 370/135 capability for under $5,000
- 16-bit MPUs under 50¢ (OEM)
- Most datacomm at 1200 baud
- English Language programming commonplace
  - Plasma replaces CRTs
  - Nonimpact printers for most computer output
  - Punched cards 90% gone

1990

- Electric autos for most urban transportation
- 4-day workweek
- Energy availability restricts economic growth
- Portable telephones widely used
- Electronic mail common
- Satellites for most business datacomm
- Most large CPU sites use building-to-building satellite transmission
- Most business decisions aided by computer models
- "At-home" computer shopping
- Powerful home computers for 1 month of executive's pay
- Most memory at remote vs. central sites
- The last general-purpose disk drive will be made
- One billion characters of millesecond access memory under $1K
  - Terminal stations 80% of hardware shipments
  - Voice input widely used on computer systems
    - Airships for long-haul of most freight

2000

- Supersonic jets for most transcontinental travel
- Woman president of the U.S.
- Man lands on Mars
- Parents are able to choose a baby's sex
- Robots for home use
- Visual display/hard copy for most business phones
- Teleconferencing in place of most business meetings now requiring travel
  - Zero population growth most nations
    - Solar (and wind,wave) energy supplies over 50% of U.S. needs
      - Electronic systems for newspaper, magazine delivery

2050 ... 2100

- Compatible neurological signals communicate directly with brain
  - Thousands of people live in space colonies

Never

- APL as predominant programming language
- Diskette sales surpass other mag media in $
- Most personal decisions aided by computer model
- Full time programmers extinct
- Full time data processing managers extinct
- CPU and memory designers extinct
- Central DP centers and organizations obsolete

Note: Respondees were asked to pick five questions on which they felt especially confident of their answers. The resultant "expert" opinions were mixed, compared to overall survey results, but were generally bullish when it came to technological questions . . . and less optimistic when societal considerations came into play. Thus, the technology might be available for home computers, for instance, but not the social and regulatory wherewithal to make use of them.

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EDP industry report

A14

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

DAVID MOSCHELLA EDITOR MARCH 31, 1984 ● V/19, NO.23 P.J. MCGOVERN, PUBLISHER

INTERNATIONAL DATA CORPORATION

AT&T shows 3B hardware -- Page 6

A LOOK AT THE CHANGING DP LANDSCAPE, AS GRAY SHEET CELEBRATES 20th ANNIVERSARY

It was 20 years ago this week that the inaugural issue of the Gray Sheet gained immediate notoriety by revealing that IBM expected to ship 5,000 units of its then yet-to-be-announced System 360. Events later proved the treachery of market forecasts as Big Blue went on to ship 35,000 360 systems, establishing a de facto software standard that is still with us today.

Since then, the Gray Sheet has observed the steady decentralization of computing power -- in movements that uncannily track the rhythms of the decades. Mainframes, which arrived in the 1950s, took hold in the 1960s. Minis, created in the 60s, became widespread in the 70s. Micros, offspring of the 70s, have grown up in the 80s. In this issue, EDP/IR takes a look back at the changing players, markets, and technologies, while taking time out for the ironies, lessons, and delights of history. Some facts that help quantify the events of the last twenty years:

- In terms of user spending, the industry has grown 21-fold from $4.1 to $86.3 billion. This translates into an average compound growth rate of 16.5%. Over this time, inflation has averaged about 6%.

- Large system processing costs have fallen by some 14% per year. Disk storage has dropped even faster at 21%, and the price of a megabyte of semiconductor memory has fallen from $1.6 million in 1964 to about $10,000 today, a rate of 22% per year.

- The number of U.S. firms in the industry has grown from about 100 in 1964 to over 12,000 today, a growth rate of 27% per year.

- In terms of the value of worldwide shipments, IBM's overall hardware market share has fallen from about 75% in 1964 to 47% in 1982.

- Since the 1960s, Japanese firms have become much more important, and European firms less so. Six of the top ten independent chip makers are Japanese, and three Japanese firms are among the world's top ten information product firms. Europe is not represented on either list.

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TOP TEN U.S. INDEPENDENT COMPONENTS MAKERS

	Valves Pre-1955	Transistors 1955	Semiconductors 1965	Int. Circ. 1975	Int. Circ. 1983
1.	RCA	Hughes	Tex. Instr.	Tex. Instr.	Tex. Instr.
2.	Sylvania	Transitron	Motorola	Fairchild	Motorola
3.	Gen. Electric	Philco	Fairchild	Nat. Semi.	Nat. Semi.
4.	Raytheon	Sylvania	Gen. Instru.	Intel	Intel
5.	Westinghouse	Tex. Instr.	Gen. Elec.	Motorola	AMD
6.	Amperex	Gen. Electric	RCA	Rockwell	Fairchild
7.	Nat. Video	RCA	Sprague	Gen. Instr.	Signetics
8.	Ranland	Westinghouse	Philco	RCA	Mostek
9.	Elmac	Motorola	Transitron	Signetics	RCA
10.	Landsdale	Clevite	Sylvania	Amer. Micro.	Gen. Instr.

Source: The Economist; Semiconductor Industry Association.

LEADING U.S. COMPUTER COMPANIES, 1952-1983
(Copyright 1984 -- International Data Corporation)

	1952	1962	1972	1983 (U.S.)	1983 (worldwide)*
1.	Sperry	IBM	IBM	IBM	IBM
2.	IBM	Sperry	Honeywell	Burroughs	NEC
3.		CDC	Sperry	DEC	Tex. Instru.
4.		RCA	Burroughs	NCR	Burroughs
5.		NCR	CDC	CDC	Motorola
6.		Gen. Elec.	NCR	Sperry	DEC
7.		Honeywell	DEC	HP	NCR
8.		Burroughs	HP	Honeywell	Fujitsu
9.			Xerox	Wang	Hitachi
10.			Data Gen.	Apple	CDC

Notes: Rankings for 1952-1972 are based on value of worldwide shipments as estimated by IDC. 1983 rankings are based on computer industry revenues. Worldwide estimates include semiconductor and communications products.

For those who need a reminder of just how thorough a shakeout can be, consider this list of the key players in the minicomputer (then called special purpose systems) market in 1966. A list of the peripheral makers back then would include even more long-forgotten entities.

Adage	Advanced Scientific Instr.	Applied Dynamics
Astrodata	Beckman Instr.	Bunker Ramo
Collins Radio	Computer Control	Computer Products
Conductron	Data Machines	DEC
Electronic Assoc.	Foxboro	Milgo Electronic
Raytheon	Reeves Instrument	System Engr. Labs
Teledyne		

On the software side things have been a little more stable. The leaders back in 1966 were: Aries; Auerbach; ADP; Arthur Anderson; Applied Data Research; Bolt, Beranek, and Newman; Booz, Allen & Hamilton; Brandon Applied Systems; C-E-I-R; Charles Adams Associates; Computer Applications; Computer Sciences; Computer Usage; Comress; Diebold; Digitek; Informatics; Mesa Scientific; Planning Research; System Development Corp; and URS Corp.

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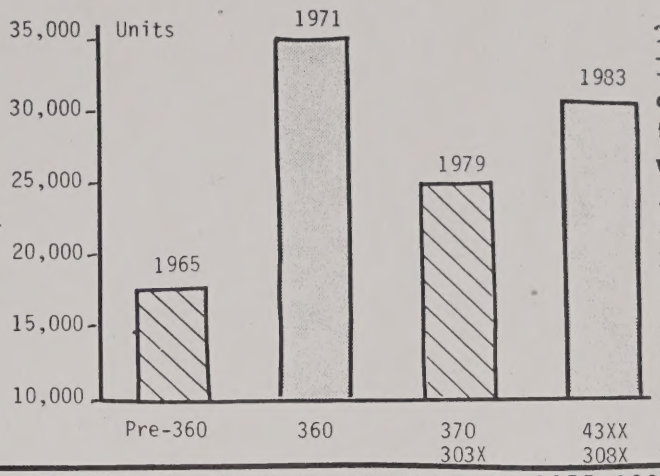
MAXIMUM WORLDWIDE INSTALLED BASE OF IBM GENERAL PURPOSE FAMILIES

(Copyright 1984 -- International Data Corp.)

The figures show the surprising fact that in terms of units, the 360 was the most popular mainframe of all time. But many of these were at the low end, where S/34s, S/3s and S/38s eventually took over.

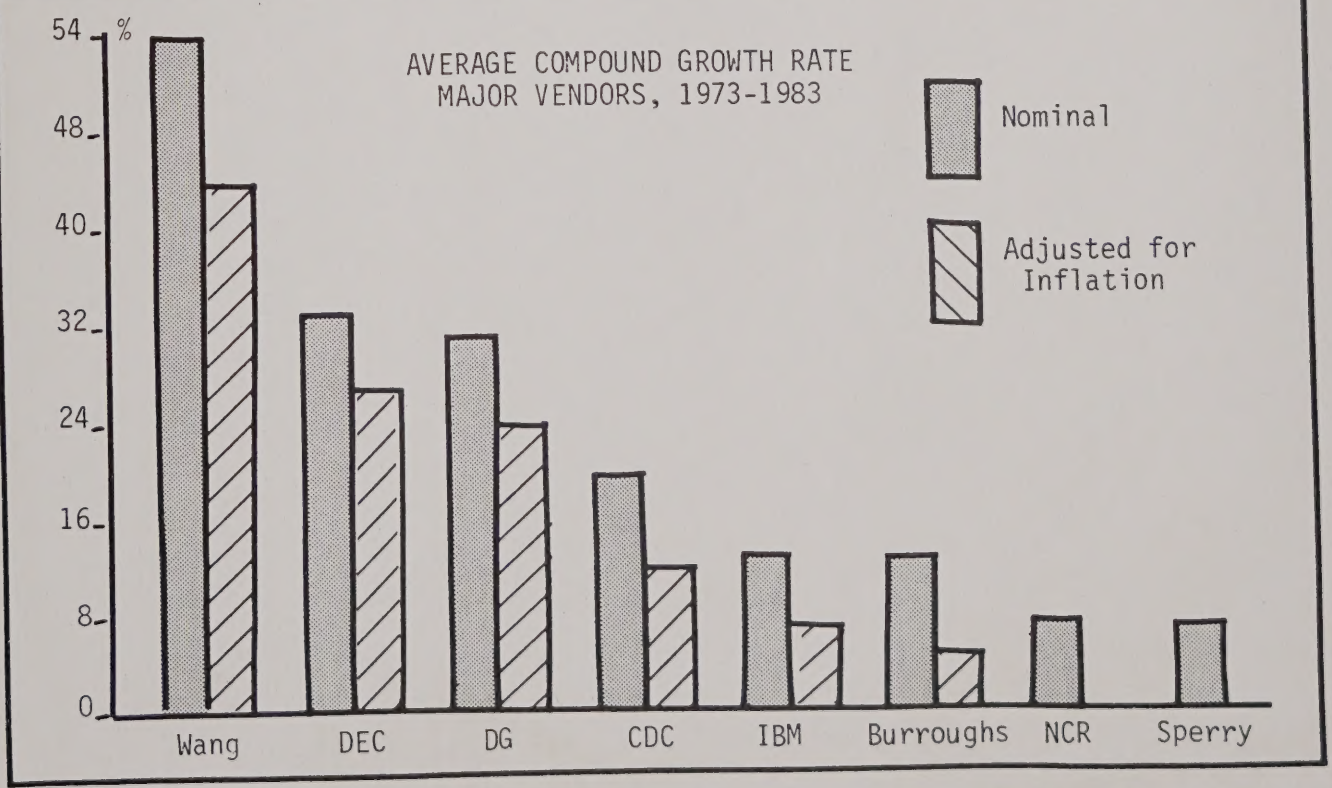


The product families are grouped on technology criteria. The 303X was not so much a family of its own as an extension of 370 thinking. Similarly, the 4300s and 308X are linked by common packaging techniques.

A HISTORY OF COMPUTER TECHNOLOGY, 1955-1983

	1955	1960	1965	1975	1983
Cost	$14.54	$2.48	47¢	20¢	7¢
CPU time	375 seconds	47 sec.	29 sec.	4 sec.	1 sec.
Technology	Vacuum tubes	Transistors	Solid Logic	Monolithic	VLSI
	Mag. Cores	Channels	Large disks	Memory	Thin film
	Mag. tapes	Fast cores	New channels	Virtual	Cartridge
				Storage	Tapes

Source: IBM. The figures show the time and cost for large IBM systems to complete a fixed amount of work, and are based on an identical mix of 1,700 typical DP operations, involving millions of instructions. Included is a cross-section of payroll, discount computation, file maintenance, table look-up, and report preparation. The figures are not adjusted for inflation.



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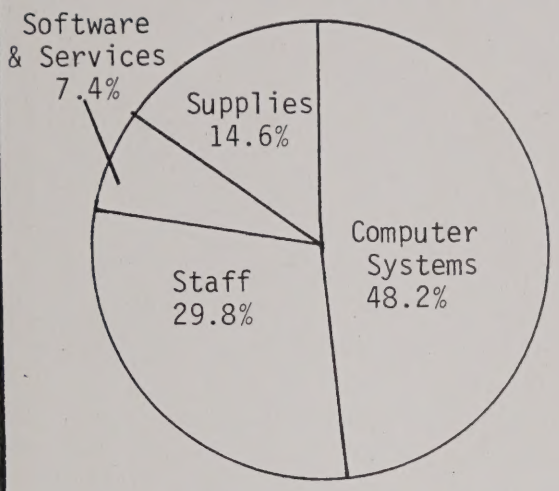
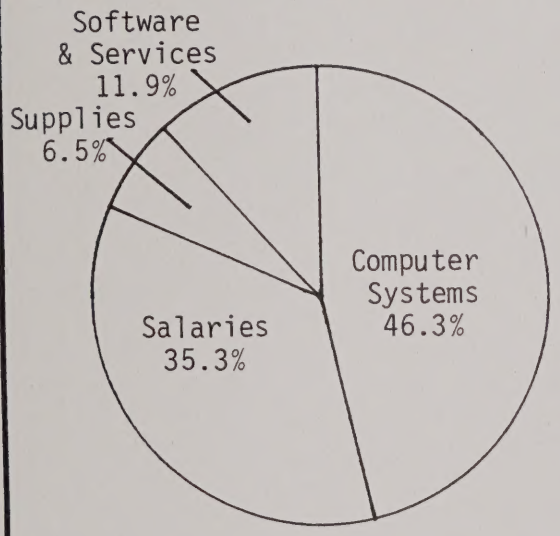
U.S. MIS USER SPENDING, 1963, 1973, 1983
(Copyright 1984 -- IDC)

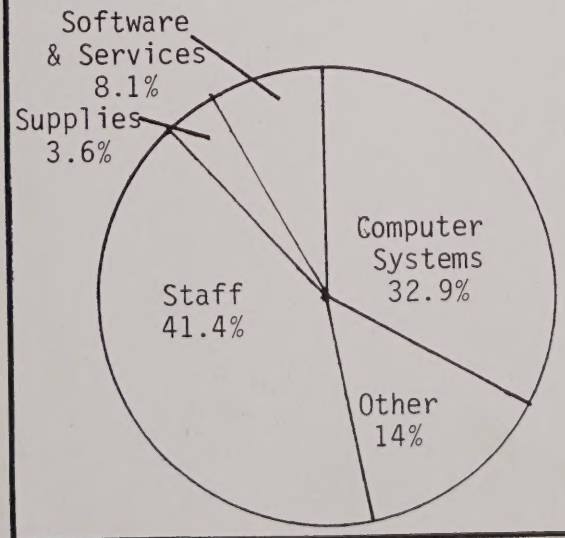
1963 -- $4.1 Billion



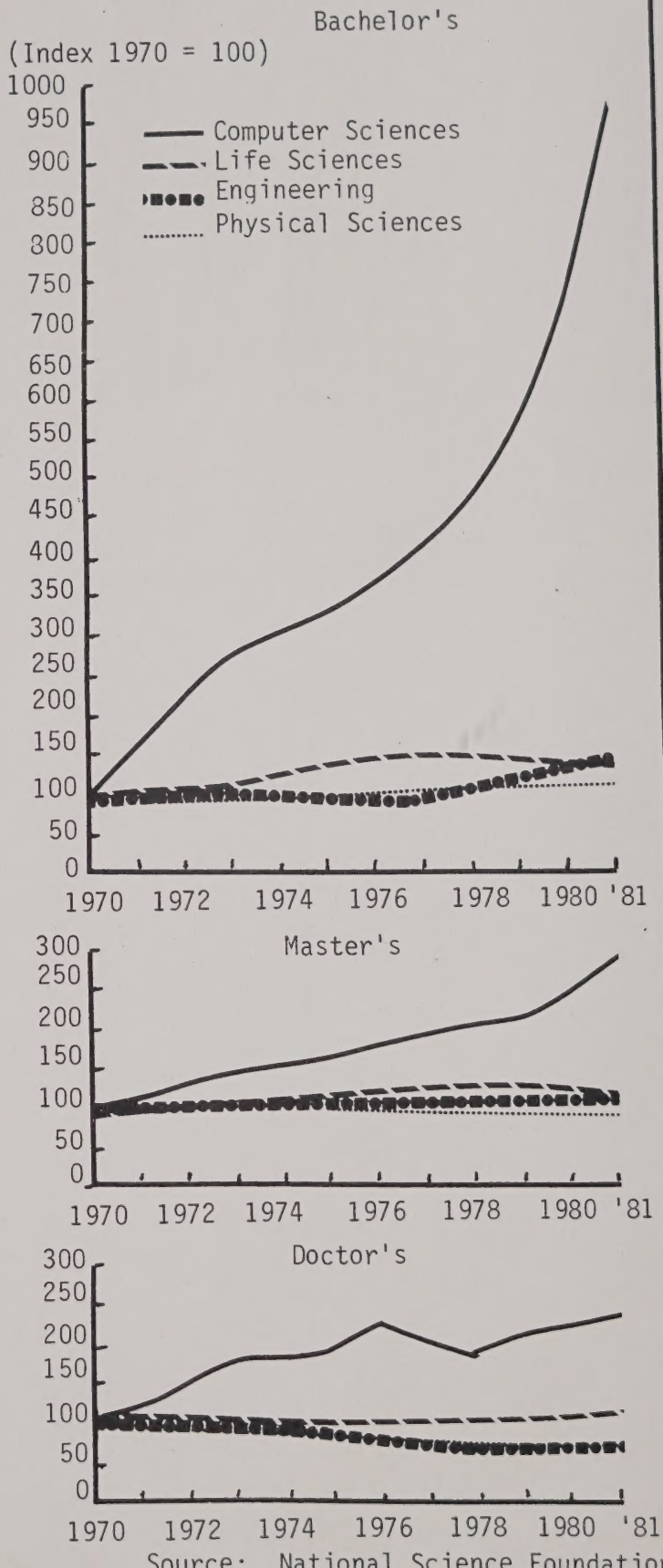
1973 -- $19.9 Billion



1983 -- $86.3 Billion



MEASURES OF U.S. COMPUTER TRAINING



Source: National Science Foundation

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THE MORE THINGS CHANGE ... (Selected quotes from EDP/IR, 1964-74)

Amen

"One of the problems CDC faces with its ultra-large computer program is that it appears to be dependent on its engineering genius, Seymour Cray." (1964.)

"Incompatibility among computers has resulted in needless duplication, delay and waste -- both to the manufacturer and the user -- in cost, in equipment, in operating efficiency, and in manpower and skills" (1964).

"RCA's reasons for introducing a computer line which can execute programs written for the System/360 are fairly apparent. First they are counting on widespread acceptance of the /360. Second they are counting on the prospect that many users will want to establish a second vendor relationship, particularly when the second vendor offers improved price/performance." (1964)

"This year confirms that a firm doesn't have to have the most advanced computers in order to capture a profitable share of the market." (1966)

"Optical scanning has been around for as long as the computer, but it still hasn't caught on except in specialized applications. This situation may be about to change, but there are still many uncertainties in the picture." (1967)

"A current instruction to IBM branch managers states, essentially: 'leasing companies are henceforth to be treated as competitors of IBM in every sense of the word.'" (1968)

"The scope of IBM's unbundling action was very broad indeed. The reduction in price, however, is very slight. Read IBM's announcement to mean a quite steep increase in user's data processing costs." (1969).

"As for the mini manufacturers, if their current shipments won't be affected by the microprocessor revolution, their prices and the eventual look of their product line will. They can choose to coopt the technology, or ignore it and focus on the lower end of the mainframe market. But when the 16-bit chip hits the street (and then the 32-bit machine) then look for a radical change in product architecture, if not a rearrangement of the industry hierarchy." (1974)

Oh well ...

"Integrated management control systems will finally be a reality in the largest corporations -- hence a good volume of (paper) forms will be bypassed." (1964)

"Every individual income tax return is now going into a massive computer file. The only way a person can avoid paying income tax, the IRS asserts, is not to make any income." (1967).

"Adapso has joined with Data Systems Inc. to sue both the Comptroller of the Currency and the American National Bank and Trust Co. Adapso says that a bank selling data processing services is 'non-banking business, not within the statutory grant of powers and unlawful.'" (1967)

"He outlined five generations: 1951- computation; 1958- DP; 1963- information processing; 1970- online processing; 1978- man's intelligent assistant (1974)."

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THE GRAY SHEET
Computer Industry REPORT

DOUG McLEOD, EDITOR August 27, 1993 VOL. 28, NO. 20-21 Published continuously since 1964.

A Pictorial Perspective on 30 Years of Change

IN THIS ISSUE:

A Pictorial Perspective on 30 Years of Change 1
Transistor Chip Density in Intel Microprocessors, 1972–1993 2
Storage Capacity (MB) Growth, 1975–1993 3
MIPS Growth in Intel Processors, 1974–1993 4
DRAM Chip Capacity 1971–1996 5
Relative Performance Growth of Four Key Technologies: Transistor Density, DRAM, MIPS, and Magnetic Storage, 1971–1993 6
U.S. Market for Multiuser and Single-User Systems, 1964–1996 7
PCs in Use Worldwide by Processor Type, 1981–1993 8
Worldwide PC Unit Shipments by Intel and Compatible Processor Type, 1981–1993 9
The Invasion of 32-Bit Machines 10
Worldwide PC Network Interface Card Market Shipments, 1985–1993 10
Worldwide Modem Shipments by Speed, 1980–1992 11
Worldwide Installed Base of Network Nodes, 1991–1995 11
Storage Explosion: Worldwide Captive and Noncaptive MB Shipped, 1987–1996 12
Dramatic Price Declines: Average Prices of Selected Hard Disk Drives, 1987–1996 12
IBM's Information Technology-Related Revenue and Overall Worldwide IT Market Share, 1965–1992 13
Worldwide IT Market by Region, 1991 and 1996 14
Worldwide IT Market by Hardware/Software Categories, 1991 and 1996 14
Beyond Sequential Processing: Parallel Machines May Provide Next Big Performance Jump 15
The Plunging Price of Mainframe MIPS 15
Employment in Software- and Hardware-Oriented Occupations in U.S. User Organizations, 1972–1988 16
Population and Communication Technology Penetration: A Wide Gap Narrowing Slowly 16
Worldwide Multiuser Systems Installations, 1987–1997 17
Worldwide Multiuser Systems, Value of Shipments, 1987–1997 17
Real and Nominal Growth of the U.S. Hardware Market, 1972–1992 18
United States IT Market by Major Category, 1969–1992 19
Penetration of Major Electronic Media in the United States, 1984–1992 20

What percentage of the worldwide population uses some kind of PC? How does that compare to ten years ago? When did Unix server sales overtake sales of other midrange systems? Is spending on mainframes really declining? How fast? Where?

Every week IDC provides its clients with facts and figures that illustrate change in the IT industry. These include questions about how new products have fared, or how trends like downsizing, outsourcing, and networking have overtaken industry tradition. Often we are asked if we have historical evidence of how such longer-term dynamics have effected change.

The information is typically needed for presentations, press releases, marketing backgrounders, and reports. More generally it is needed to answer one of four questions:

- How much further can the industry grow?
- How will growth across specific portions of the industry vary?
- How far has the industry grown over the past 30 years?
- How will a new product or new technology fare, compared to past products?

In preparation for the 30th anniversary of the Gray Sheet, we have assembled a broad range of data from an even broader array of internal and external sources to publish 27 charts and graphs that highlight the state of the IT industry, c. 1993. This issue provides a visual perspective on many of the above questions.

The charts that appear in this issue are intended for reuse. They may be reproduced and distributed, with appropriate IDC citations. Camera-ready artwork and electronic versions of the charts are available for an additional fee. Please turn to page 20 for details.

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Transistor Chip Density in Intel Microprocessors, 1972–1993

Source: International Data Corporation and Intel Corporation, 1993

One reason Intel's Pentium is so much faster than the 486 chips is because Intel crammed over three times as many transistors into the same area. That in turn allowed Intel to take functions off the board and put them right onto the chip, reducing I/O waiting. The next generation of Intel chips will likely include sophisticated compression/decompression and digital video algorithms in silicon — a multimedia computer on a chip.

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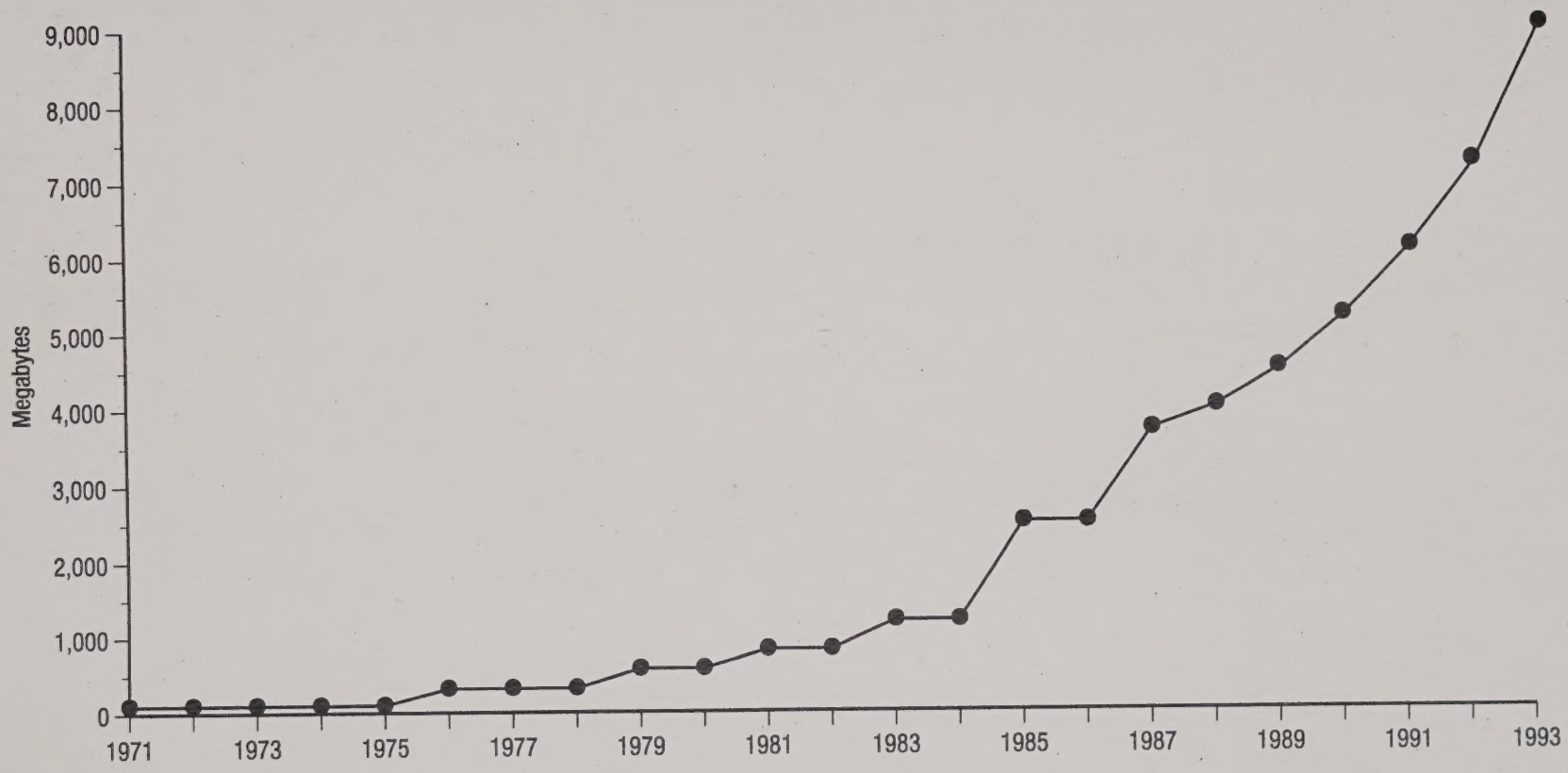
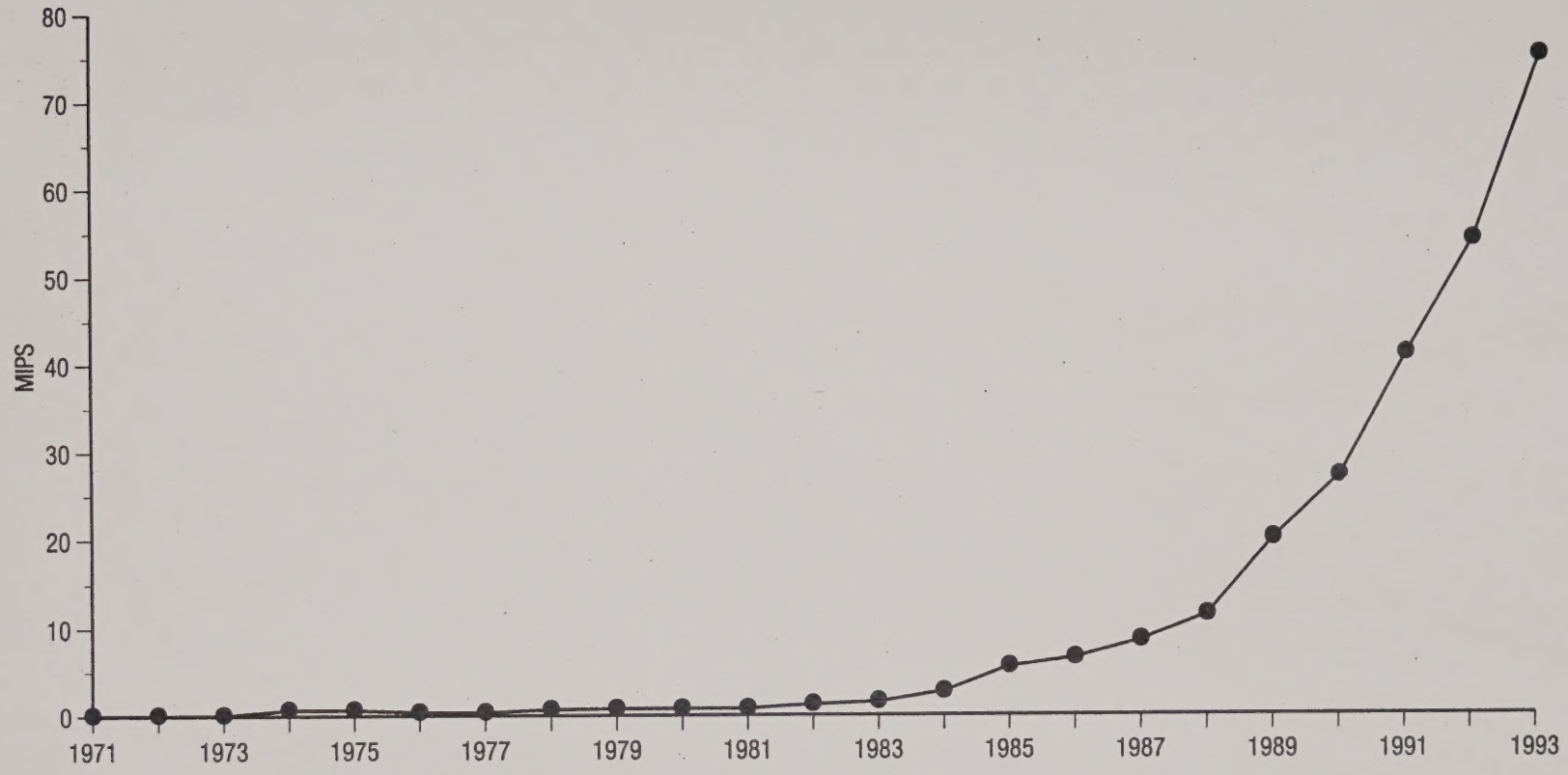
Storage Capacity (MB) Growth, 1975–1993



Source: International Data Corporation, 1993

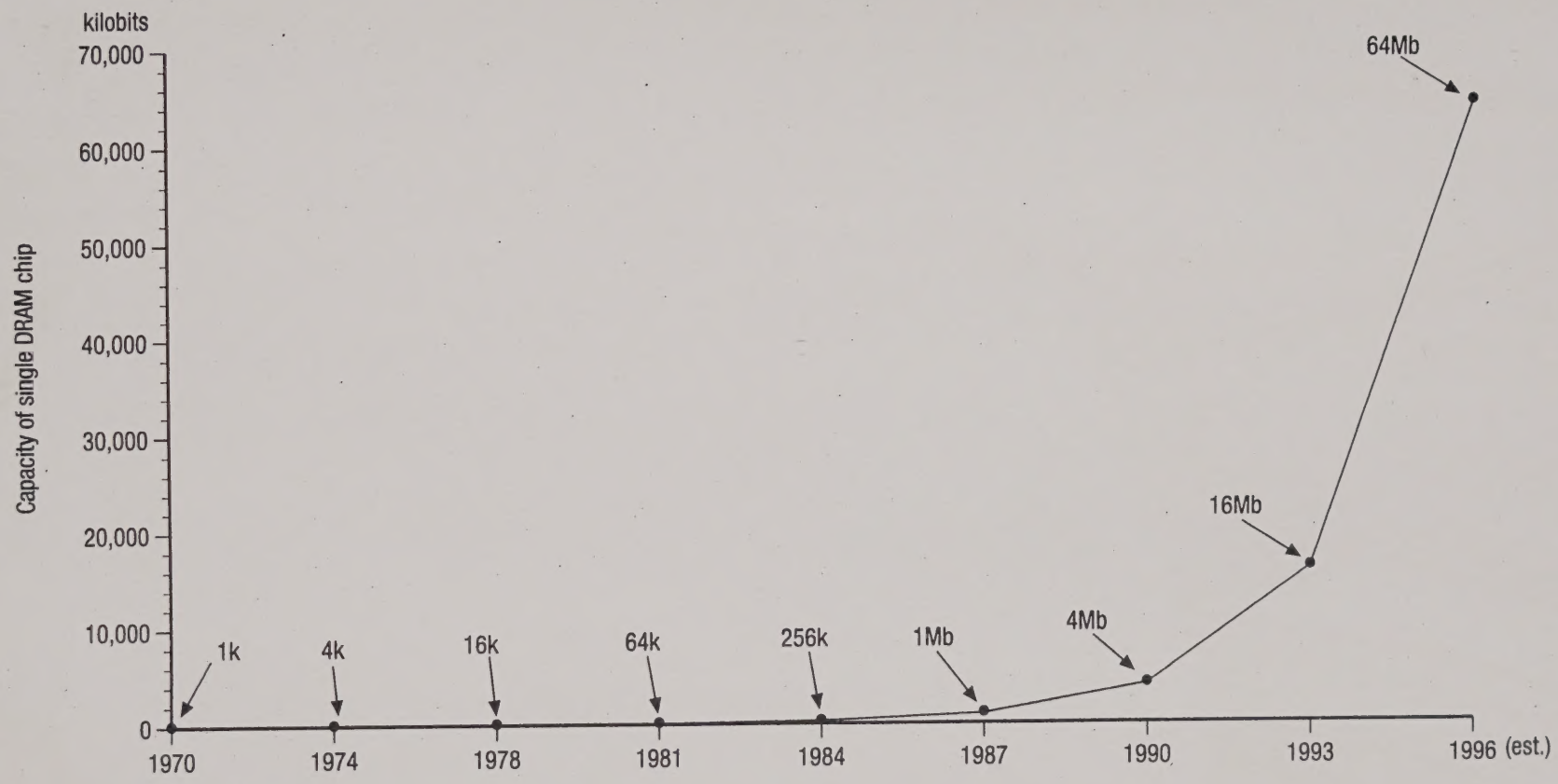
Lacking a consistent method for incorporating advances in nonmagnetic storage medium (most notably optical devices) the growth in storage performance (measured in both aerial density and overall capacity) is somewhat slower than that of chip technologies. This chart illustrates advances of single-spindle magnetic storage devices at the high end of the market.

MIPS Growth in Intel Processors, 1974–1993



Source: International Data Corporation, 1993

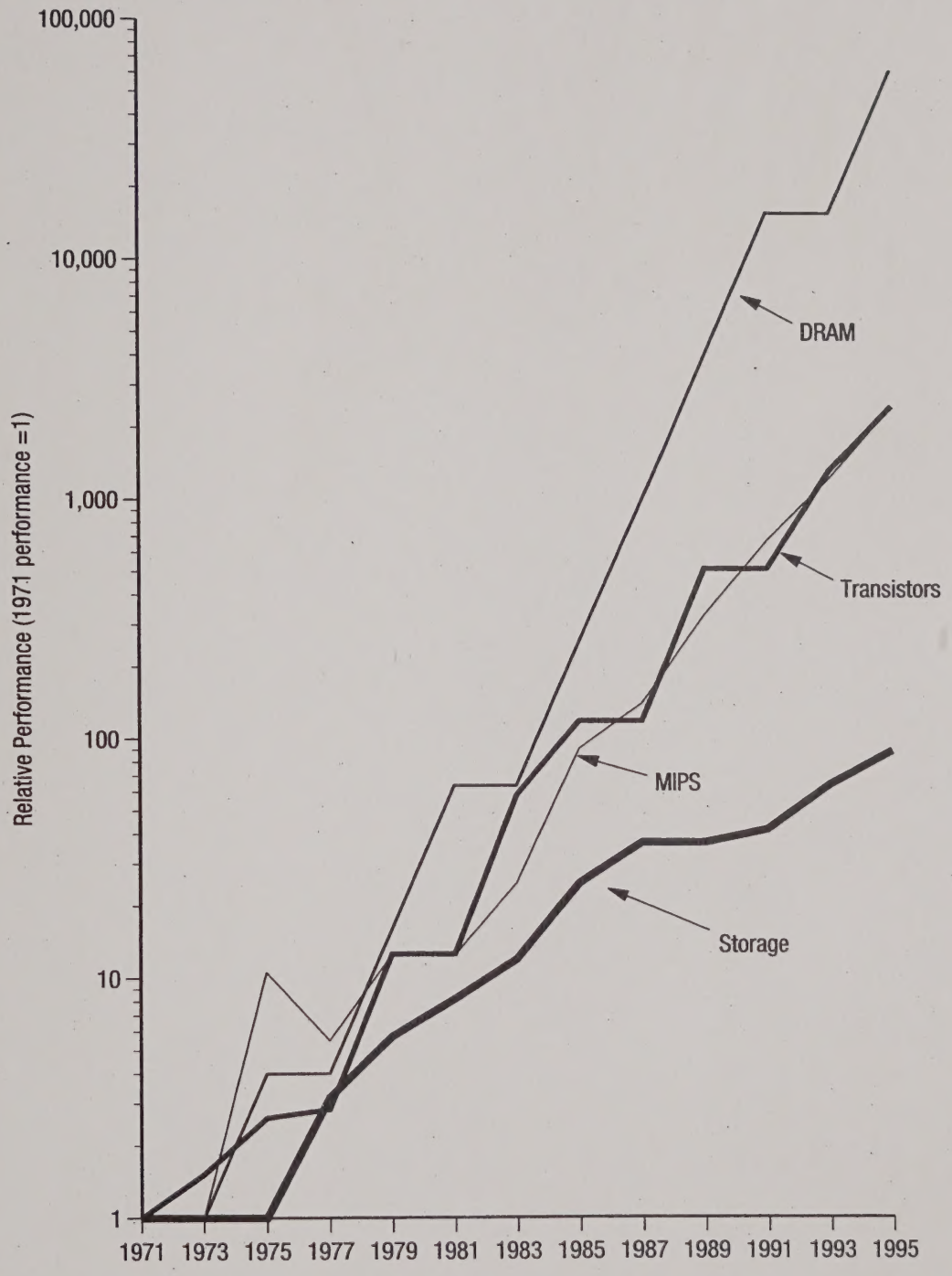
Performance advances in Intel microprocessors has been a direct function of increasing transistor density. While performance measured in MIPS across families of microprocessors can lead to inaccurate comparisons, it can be used to clearly demonstrate improvements within a single processor architecture.



Source: International Data Corporation and Intel Corporation, 1993

DRAM capacity is a direct function of transistor density. DRAM capacity has grown faster than any other computer technology.

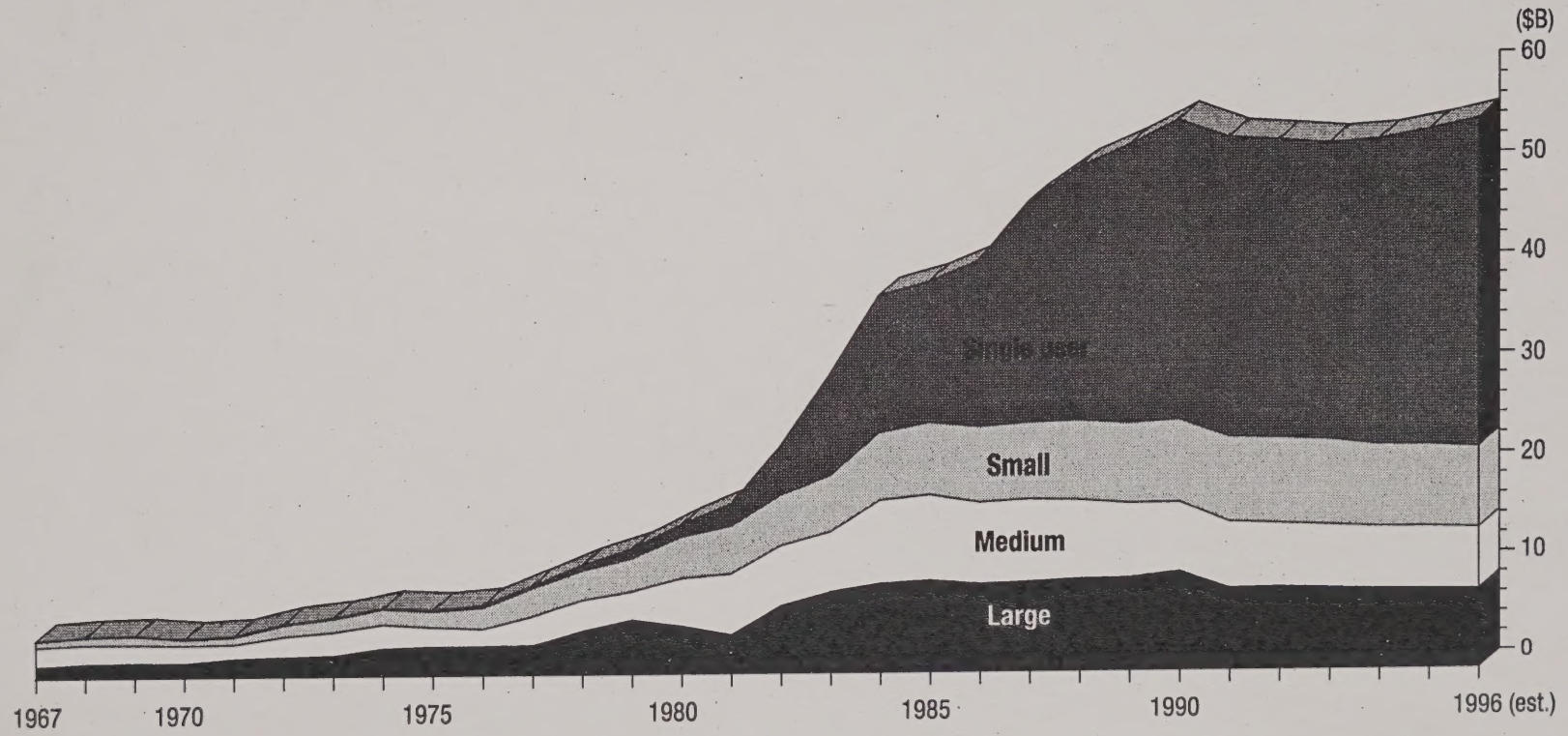
Relative Performance Growth of Four Key Technologies: Transistor Density, DRAM, MIPS, and Magnetic Storage, 1971–1993



Source: International Data Corporation, 1993

In this chart the performance of the four technologies are indexed to 1971 levels to provide a relative measure of increases. Not surprisingly, transistor density (which drives, in part, MIPS performances and DRAM capacity) has grown faster than magnetic storage.

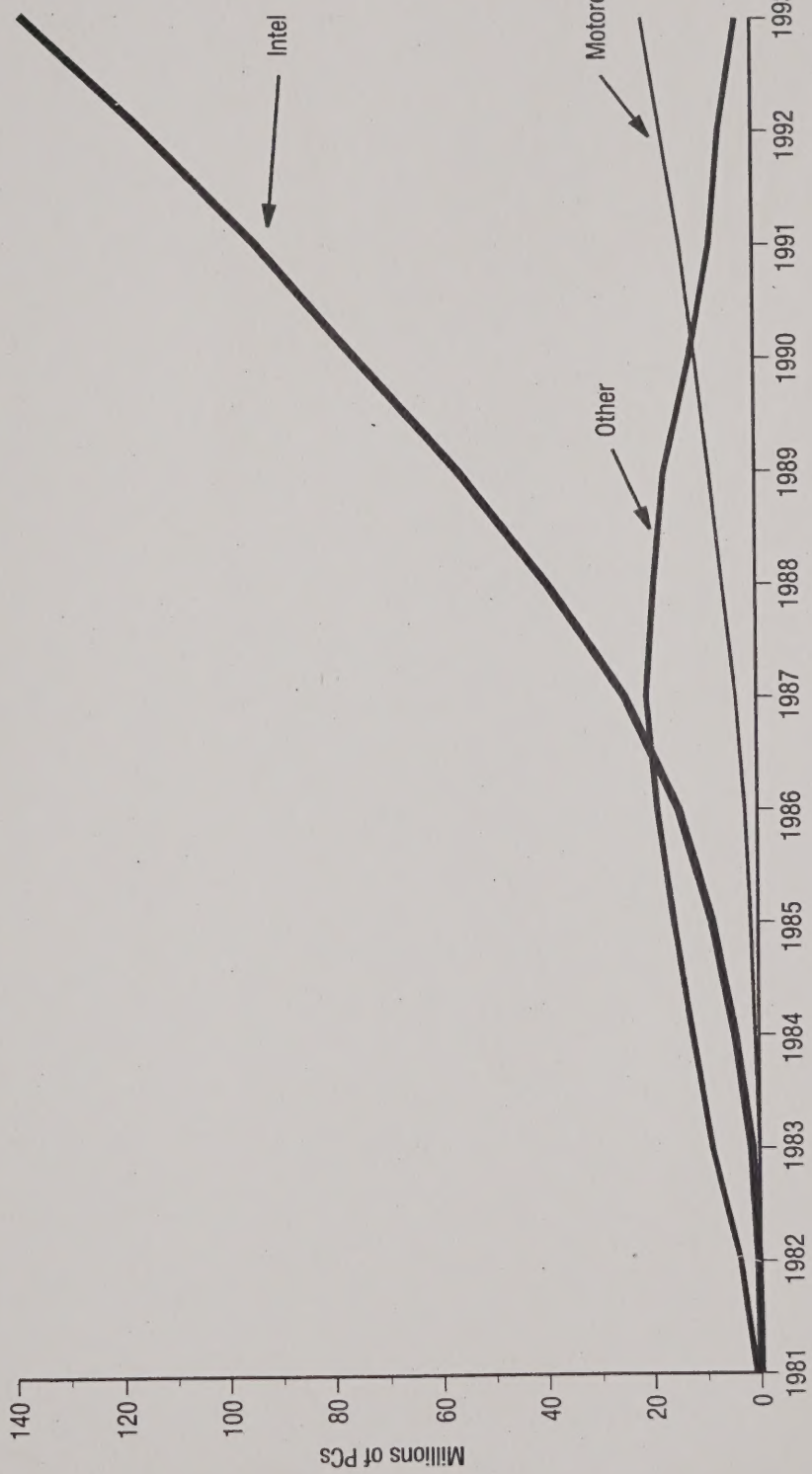
U.S. Market for Multiuser and Single-User Systems, 1964–1996 (est.)



The explosive growth of the PC market from 1981 onwards has come at the expense of other types of systems — usually larger mainframes and minicomputers — although the low end of the multiuser systems market has also seen slowed growth. After four years of moderate growth through 1985, spending on all multiuser systems has completely flattened. It is not expected to rebound over the next five years. The biggest loser: large systems, which have decreased from as much as 40% of the overall systems market in 1979 to well under 20% today.

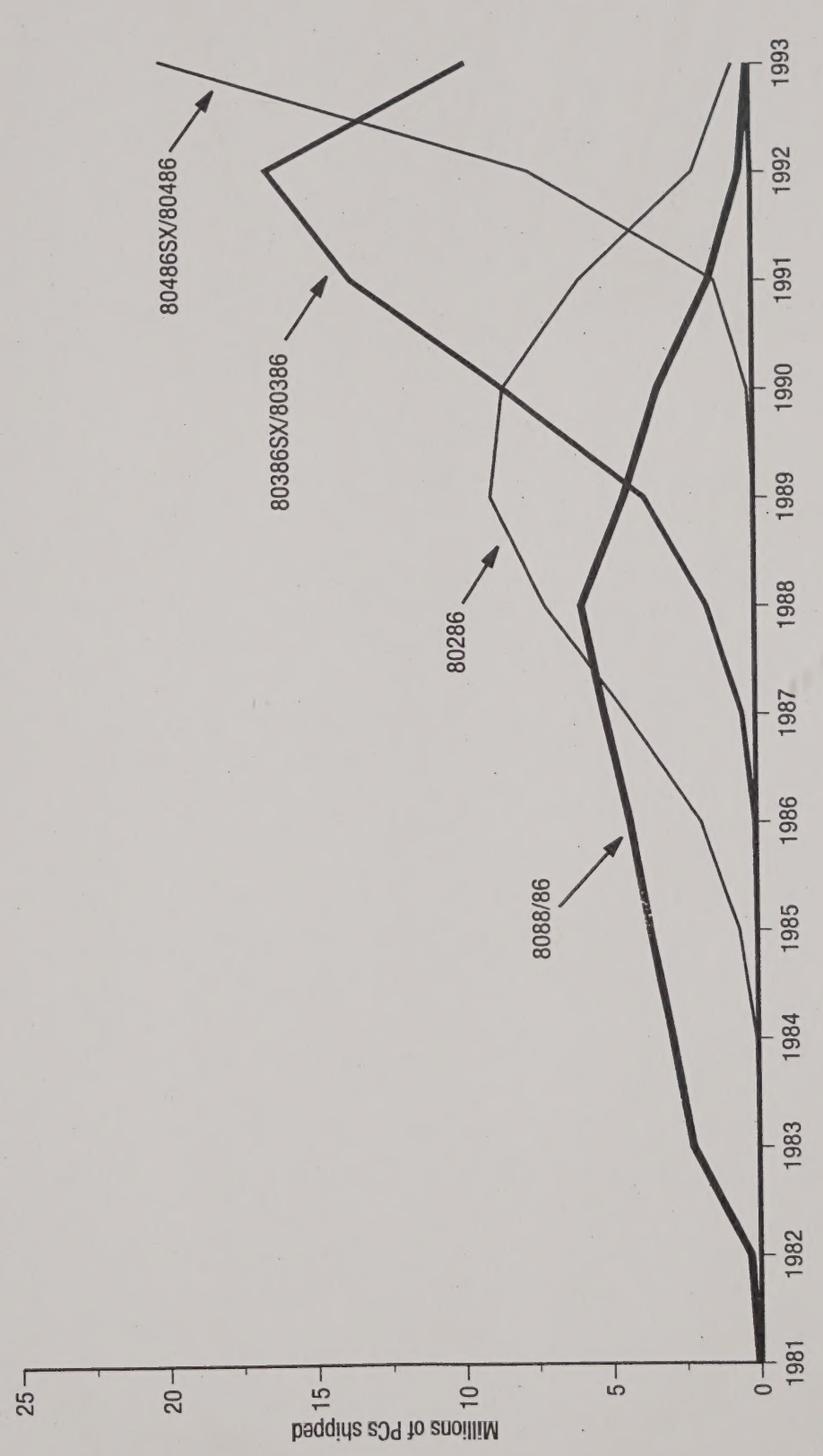
Source: International Data Corporation, 1993

PCs in Use Worldwide by Processor Type, 1981–1993



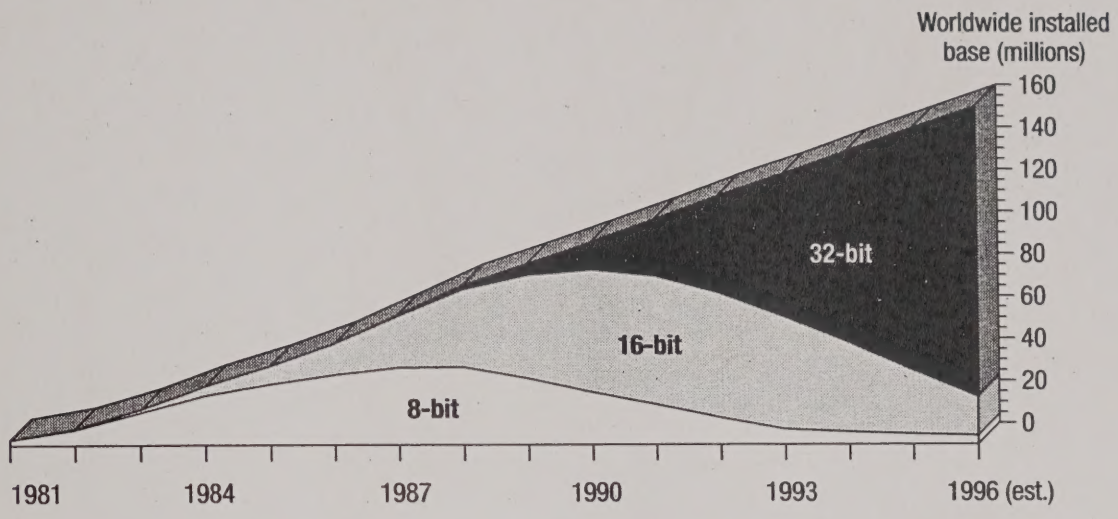
Source: International Data Corporation, 1993

Worldwide PC Unit Shipments by Intel and Compatible Processor Type, 1981–1993



Source: International Data Corporation, 1993

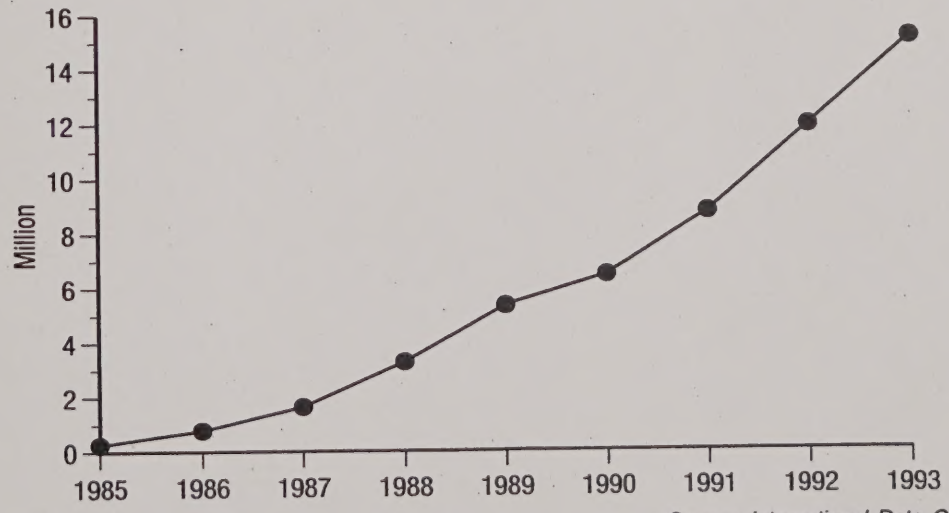
The Invasion of 32-Bit Machines



Source: International Data Corporation, 1993

Sometime this year the worldwide installed base of 32-bit PCs based on the Intel architecture (starting with the 386) will surpass that of 16-bit PCs. Between now and 1996 almost 100 million 32-bit computers will be added to that base.

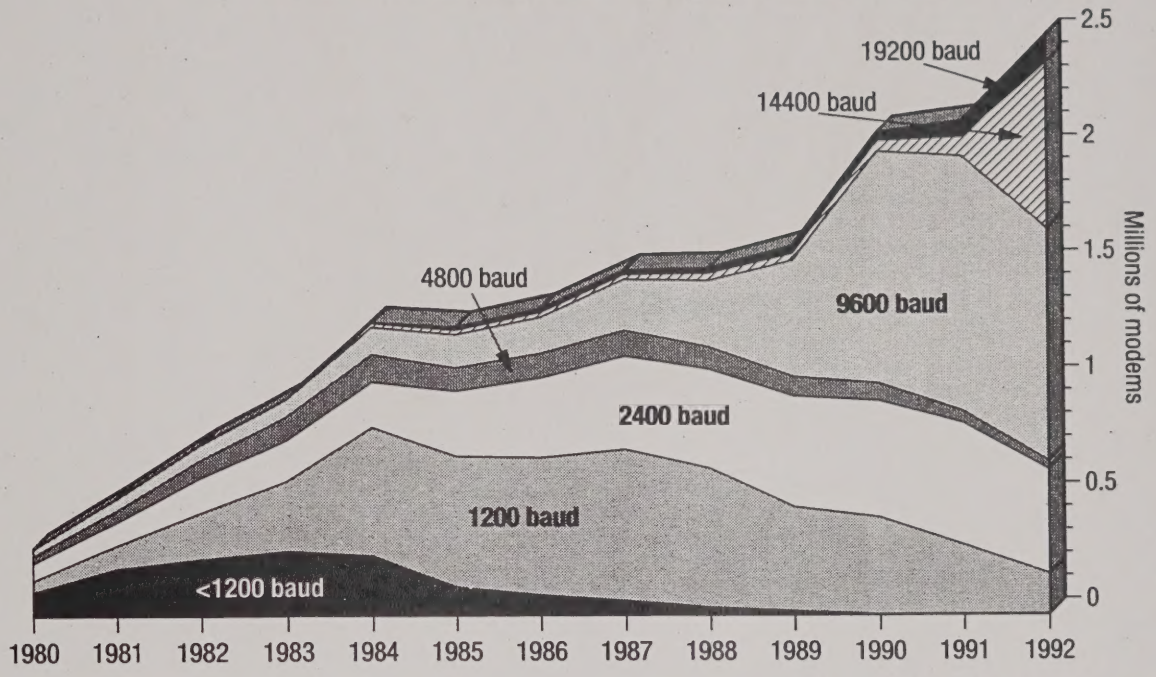
Worldwide PC Network Interface Card Market Shipments, 1985–1993



Source: International Data Corporation, 1993

Penetration of PC network interface cards is expected to continue growing through the end of the decade.

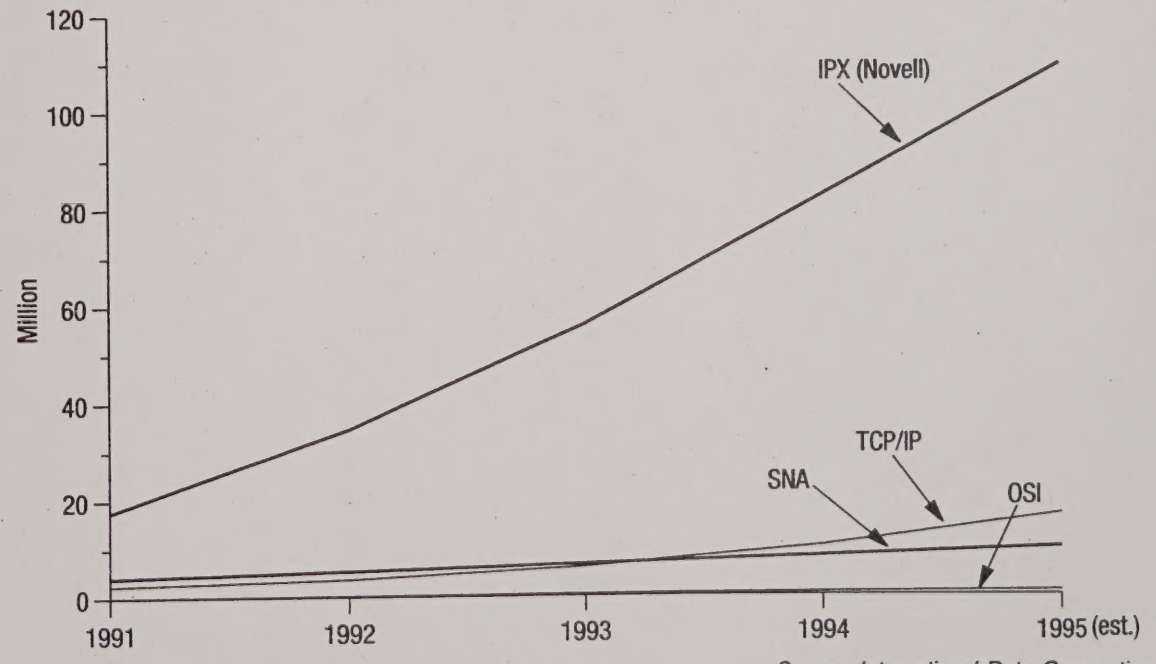
Worldwide Modem Shipments by Speed, 1980–1992



Source: International Data Corporation, 1993

Almost two-thirds of all modems sold worldwide in 1993 will be 9600 baud or faster.

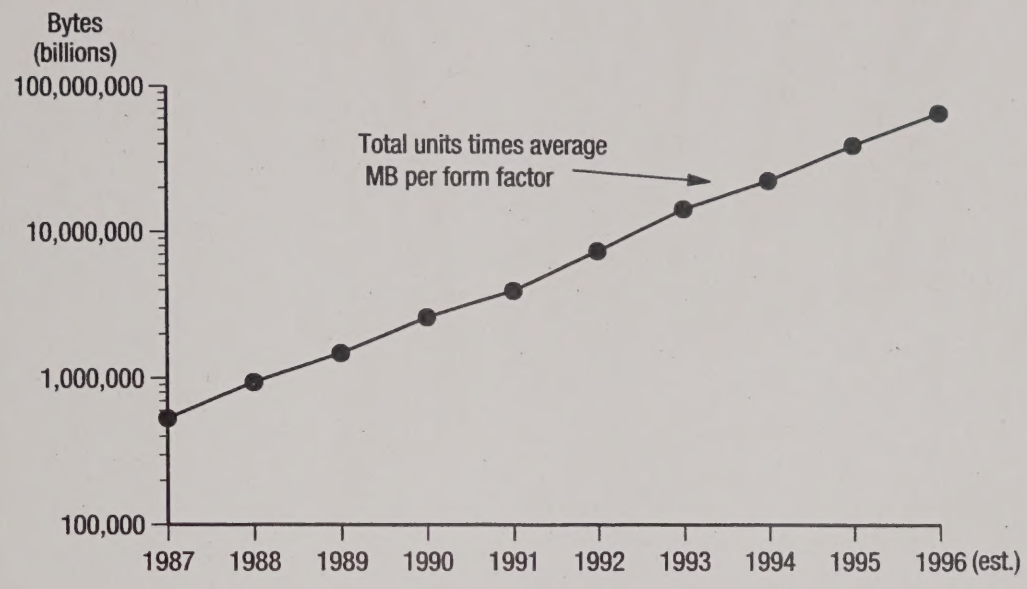
Worldwide Installed Base of Network Nodes, 1991–1995 (est.)



Source: International Data Corporation, 1993

Despite the huge interest in TCP/IP, Novell's IPX remains the most widely-used architecture for connection to a network.

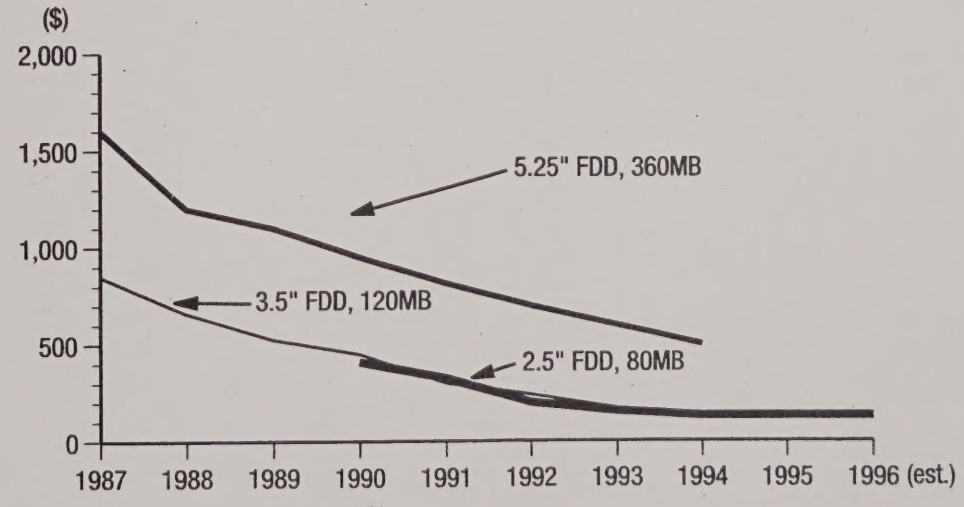
Storage Explosion: Worldwide Captive and Noncaptive MB Shipped, 1987–1996 (est.)



Source: International Data Corporation, 1993

The growth of the storage business is one good measure of the speed of change in the IT industry. This chart shows the exponential growth of all magnetic disk storage capacity projected for a ten-year period.

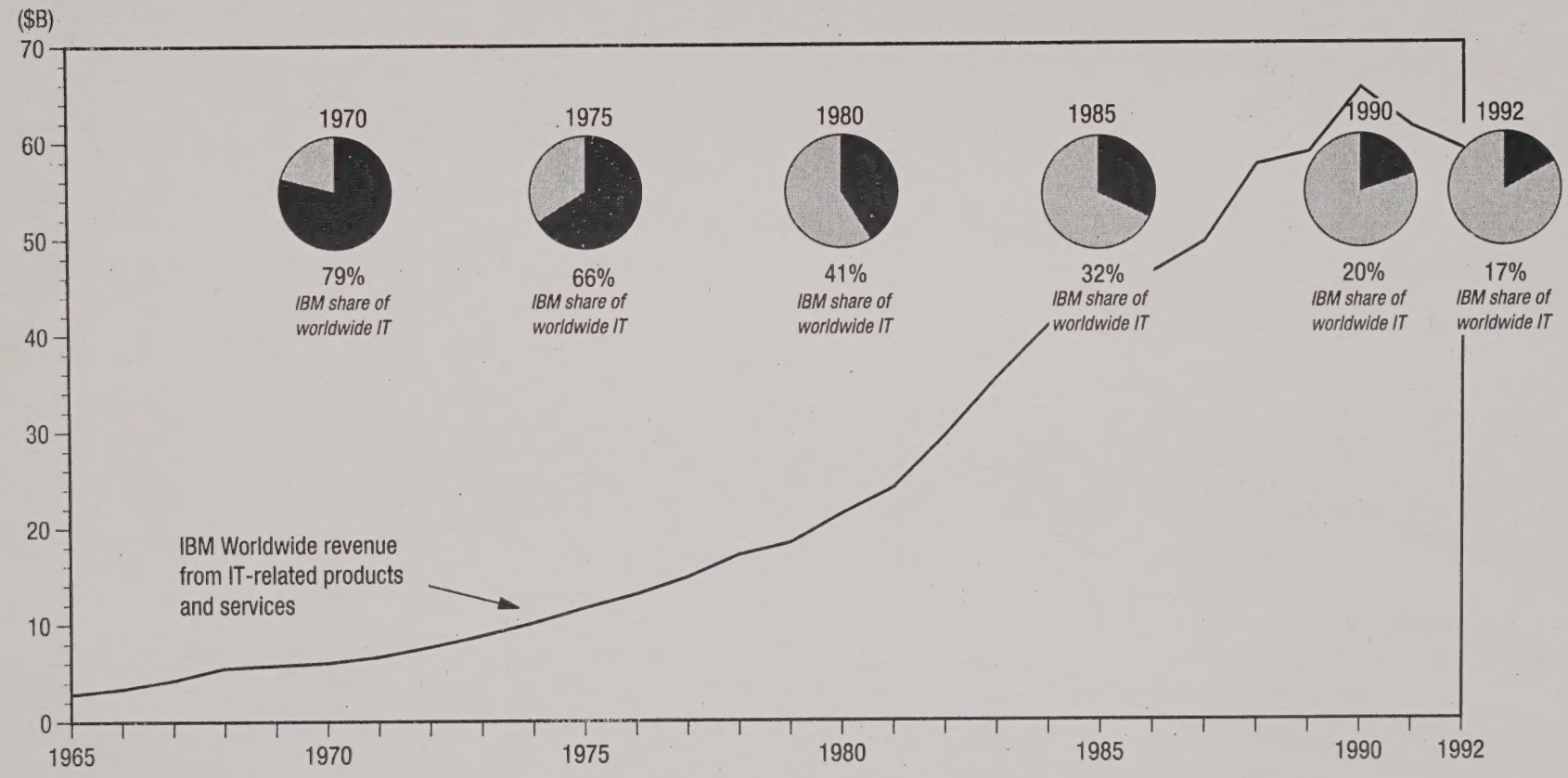
Dramatic Price Declines: Average Prices of Selected Hard Disk Drives, 1987–1996 (est.)



Source: International Data Corporation, 1993

While the technology of data storage and retrieval may not have made as dramatic performance improvements as other technologies (see page 5), prices continue to decline steadily. Real cost per megabytes has dropped at least three-fold since 1987.

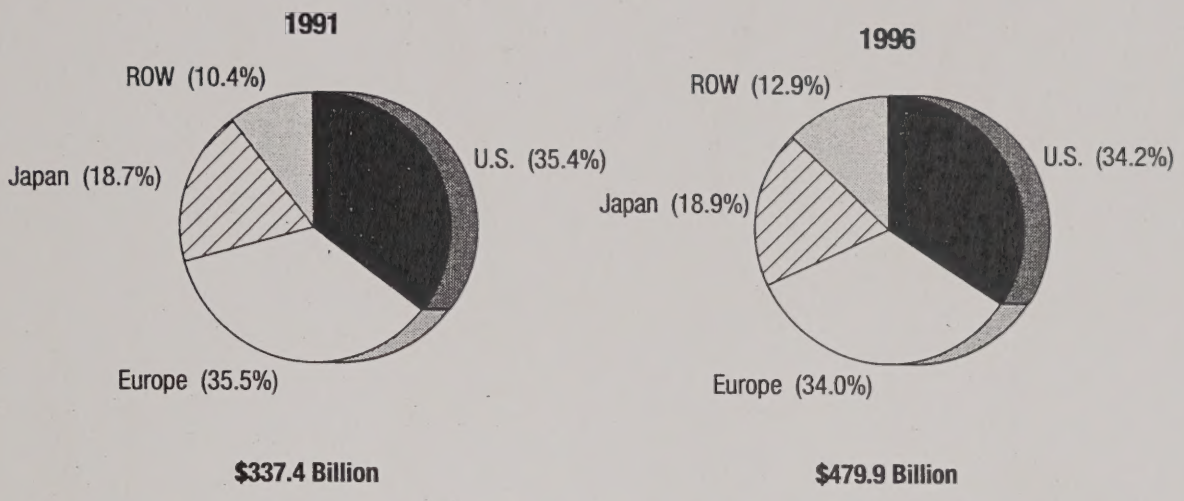
IBM's Information Technology-Related Revenue and Overall Worldwide IT Market Share, 1965–1992



IBM is no stranger to declining market share. Even before the disappointing results of the past two years, IBM has seen its influence in and dominance of the worldwide IT industry dissipate. A scant eight years ago IBM was responsible for almost one-third of the entire IT industry. Twenty years ago it accounted for three-quarters of the industry, and it drew the attention of federal regulators, who gave serious and expensive consideration to mandating the divestiture of certain lines of IBM's business. For comparison, Microsoft's current share of the worldwide desktop operating system market, by far the largest, is estimated at over 90%.

Source: International Data Corporation, 1993

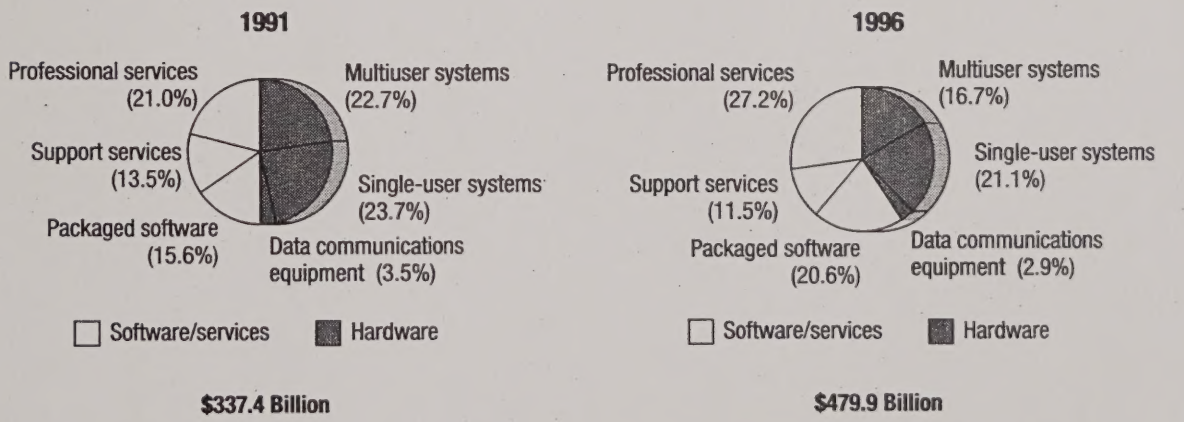
Worldwide IT Market by Region, 1991 and 1996 (est.)



Source: International Data Corporation, 1992

By 1996 developing-country markets for IT are expected to account for almost 13% of the total worldwide IT market.

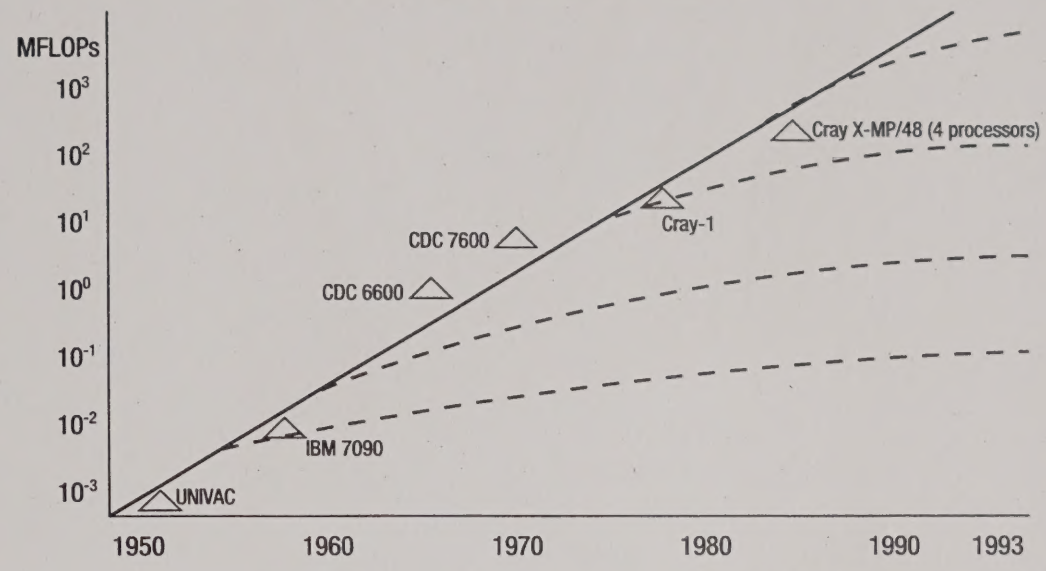
Worldwide IT Market by Hardware/Software Categories, 1991 and 1996 (est.)



Source: International Data Corporation, 1992

By 1996 hardware is expected to shrink to only 38% of the entire worldwide market for IT. Professional services and packaged software represent the two areas of greatest opportunity in the industry. They will go from 36% in 1991 to 47% of the market in 1996.

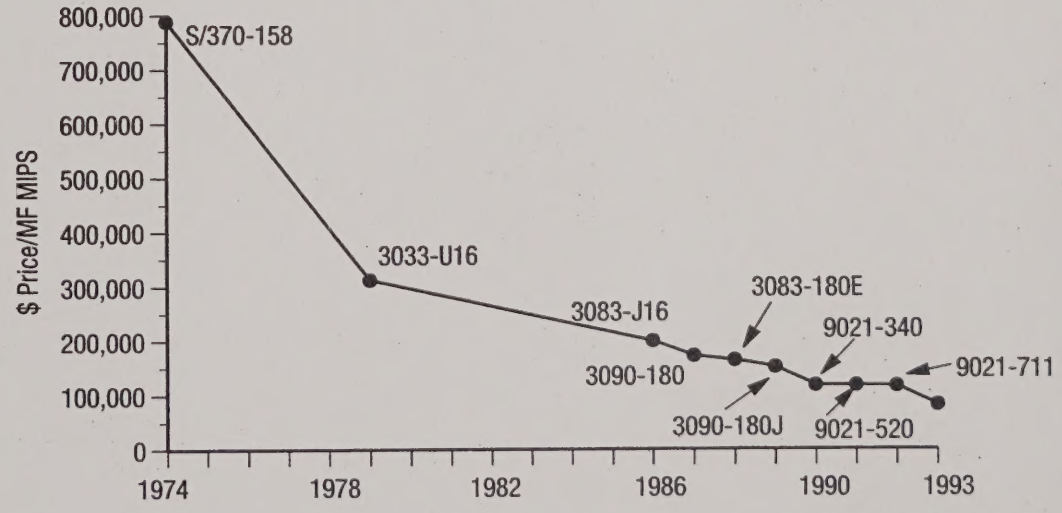
Beyond Sequential Processing: Parallel Machines May Provide Next Big Performance Jump



Source: Intel Corporation, 1986, and International Data Corporation, 1993

Sequential processing systems continue to make huge leaps in performance, but may soon meet a practical limit somewhere near 1,000 MFLOPS. Parallel processing technology may boost a new class of systems over these limits.

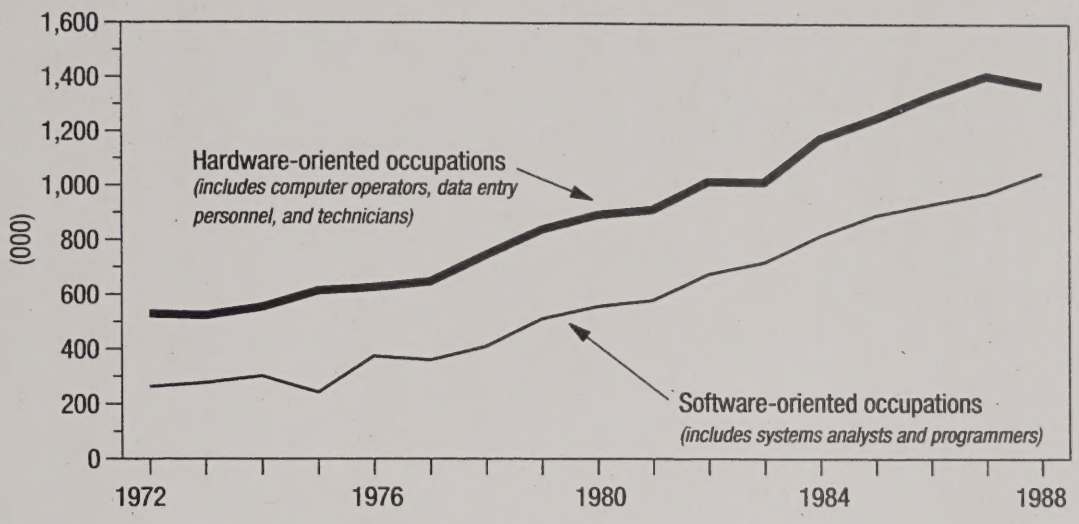
The Plunging Price of Mainframe MIPS



Source: International Data Corporation, 1993

The average street price (i.e., after discounting) of MIPS has declined by over one-third in the past ten years. However, during that period microprocessor performance has grown far more quickly. As a result, compared to the more-rapidly declining cost of microprocessor-based computing, mainframe MIPS appear to have held fairly steady for over a decade.

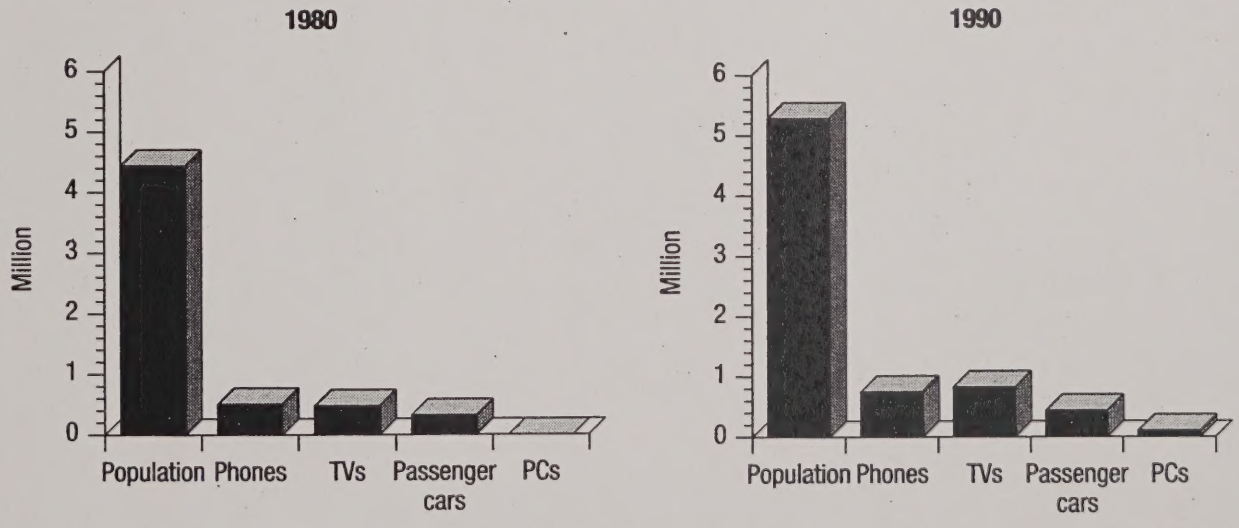
Employment in Software- and Hardware-Oriented Occupations in U.S. User Organizations, 1972–1988



Source: CBEMA, Industry Marketing Statistics

Hardware-oriented occupations and software-oriented occupations have shown similar rates of growth between 1972 and 1988. The recent narrowing of the gap is likely to continue as systems software becomes increasingly complex and as the number of software applications grows. In addition, automated data entry and more reliable hardware are eliminating some traditional hardware-oriented jobs.

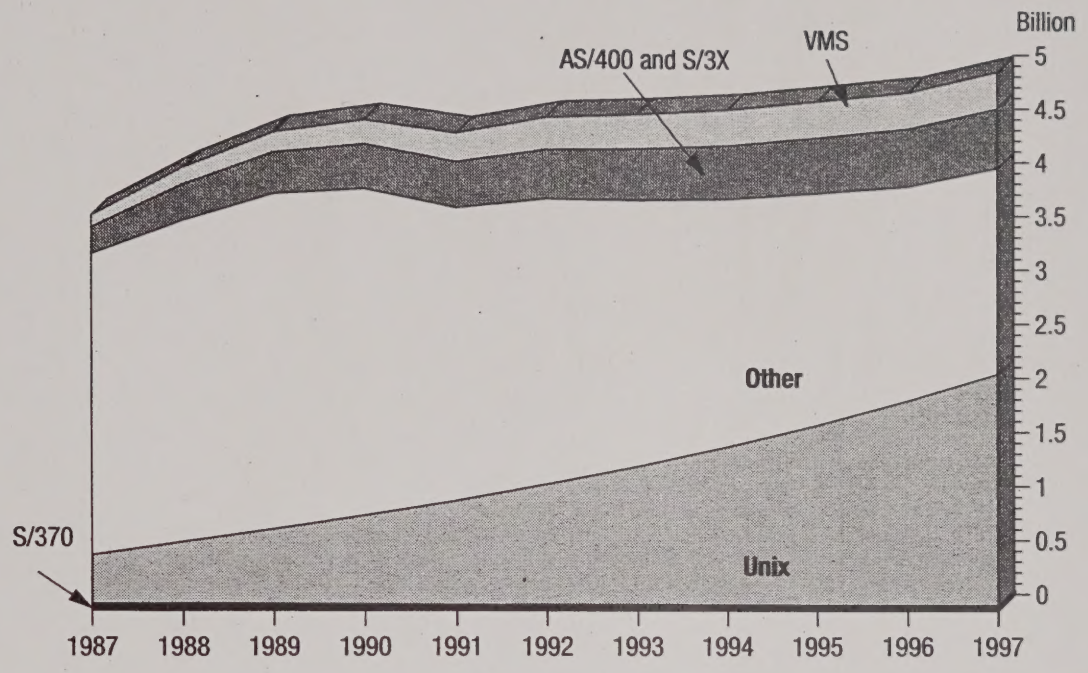
Population and Communication Technology Penetration: A Wide Gap Narrowing Slowly



Source: International Data Corporation and European/International Marketing Data and Statistics, 1993

PCs are still used by a far smaller percentage of the worldwide population than television and telephones. PC penetration is closer to passenger car penetration than to its electronics brethren. Even if current PC penetration rates are doubled, the 2000 chart will still show a wide gap between the three technologies. Of perhaps even greater interest, however, is the wide gap between all technologies and the total population.

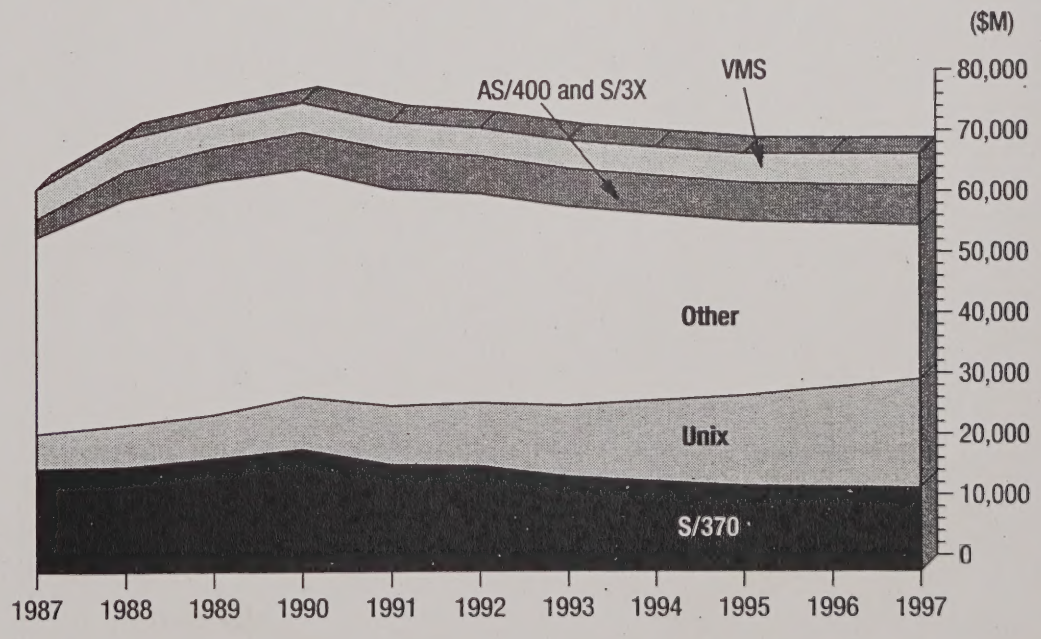
Worldwide Multiuser Systems Installations, 1987–1997



Source: International Data Corporation, 1993

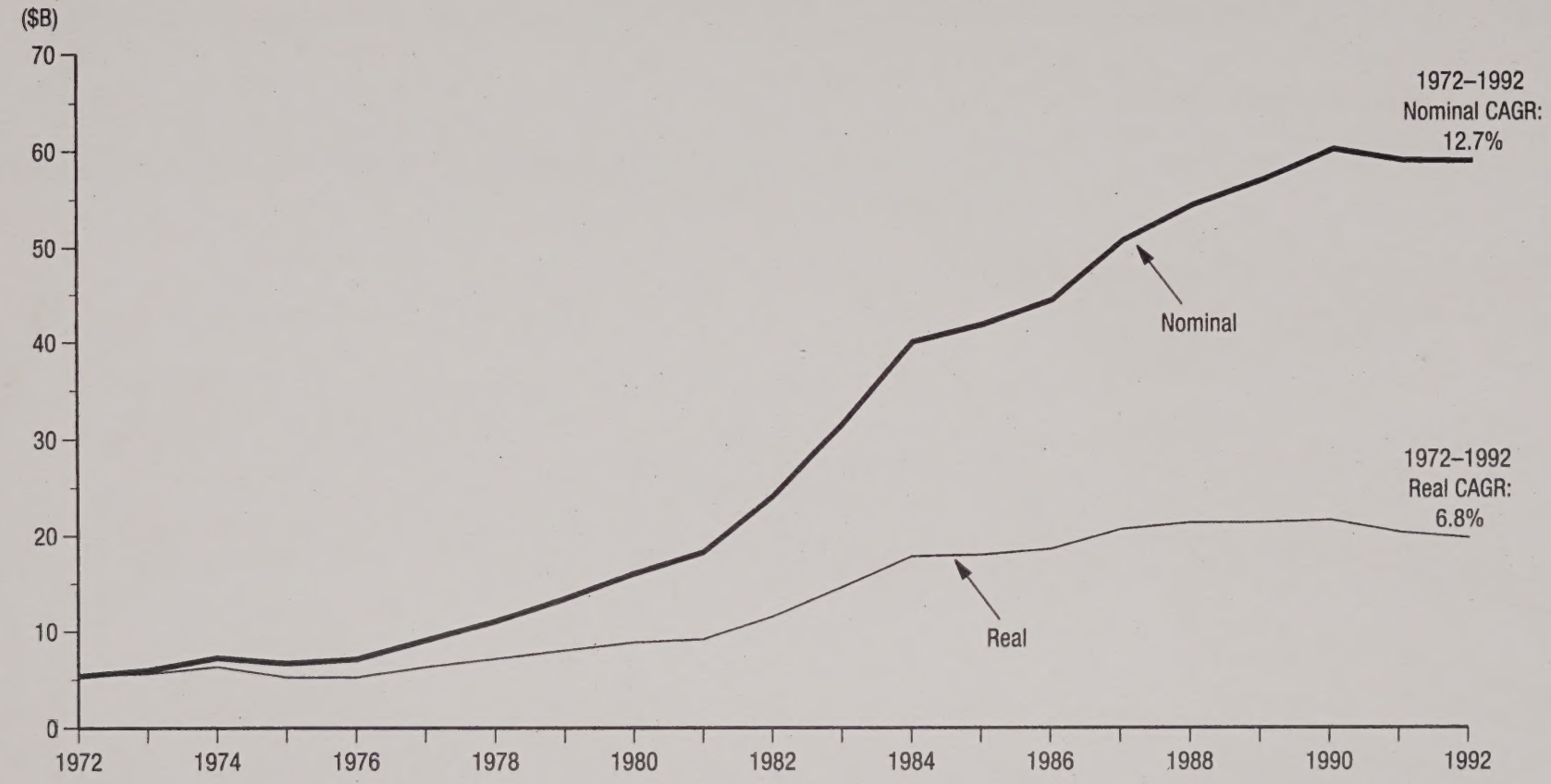
While IBM mainframe systems account for only a tiny portion of worldwide multiuser system sites (above), they account for a significant proportion of overall spending on computer systems (below).

Worldwide Multiuser Systems, Value of Shipments, 1987–1997



Source: International Data Corporation, 1993

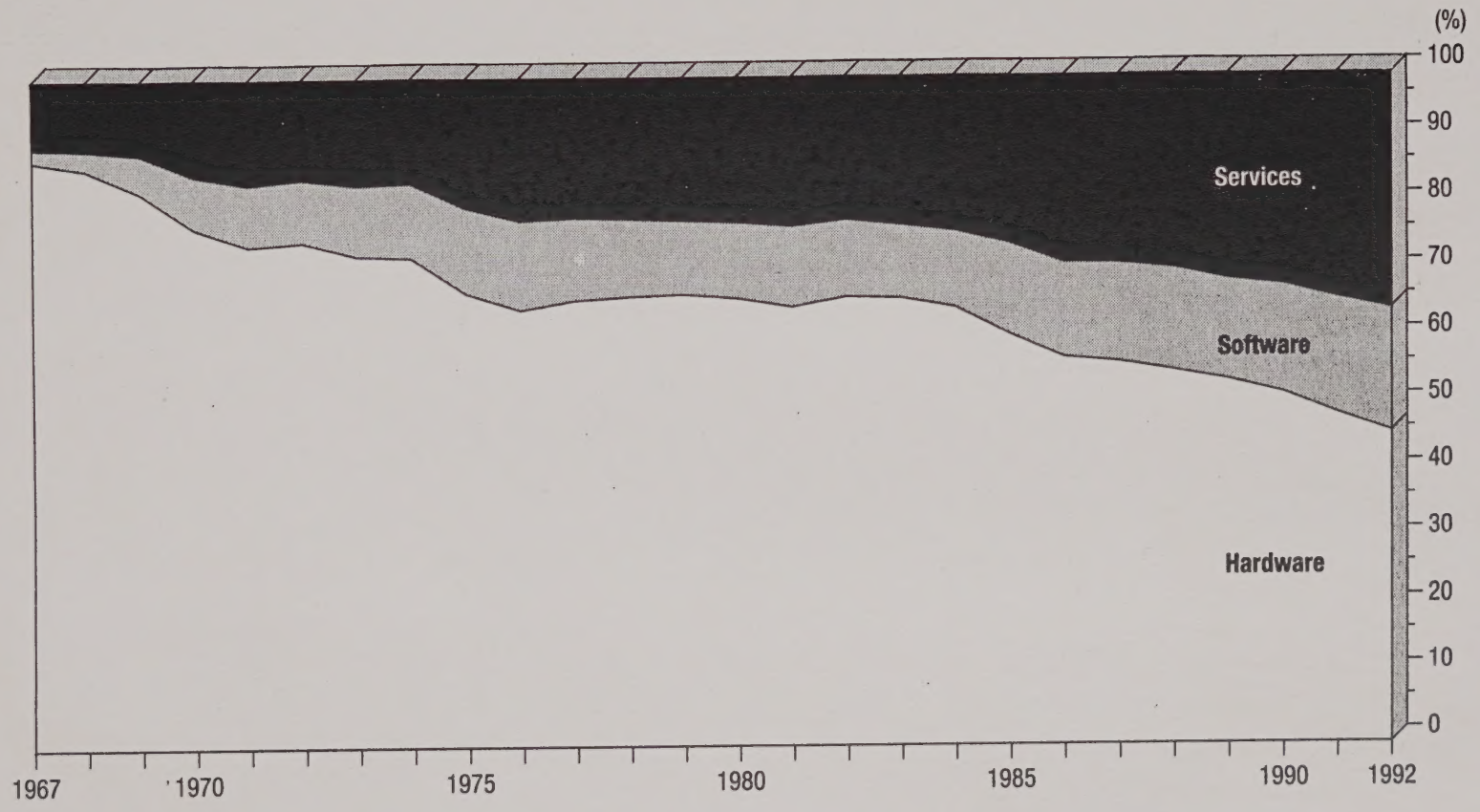
Real and Nominal Growth of the U.S. Hardware Market, 1972–1992



Source: International Data Corporation, 1993

When corrected for inflation, the U.S. hardware market has grown by a compound annual rate of only 6.8% since 1972.

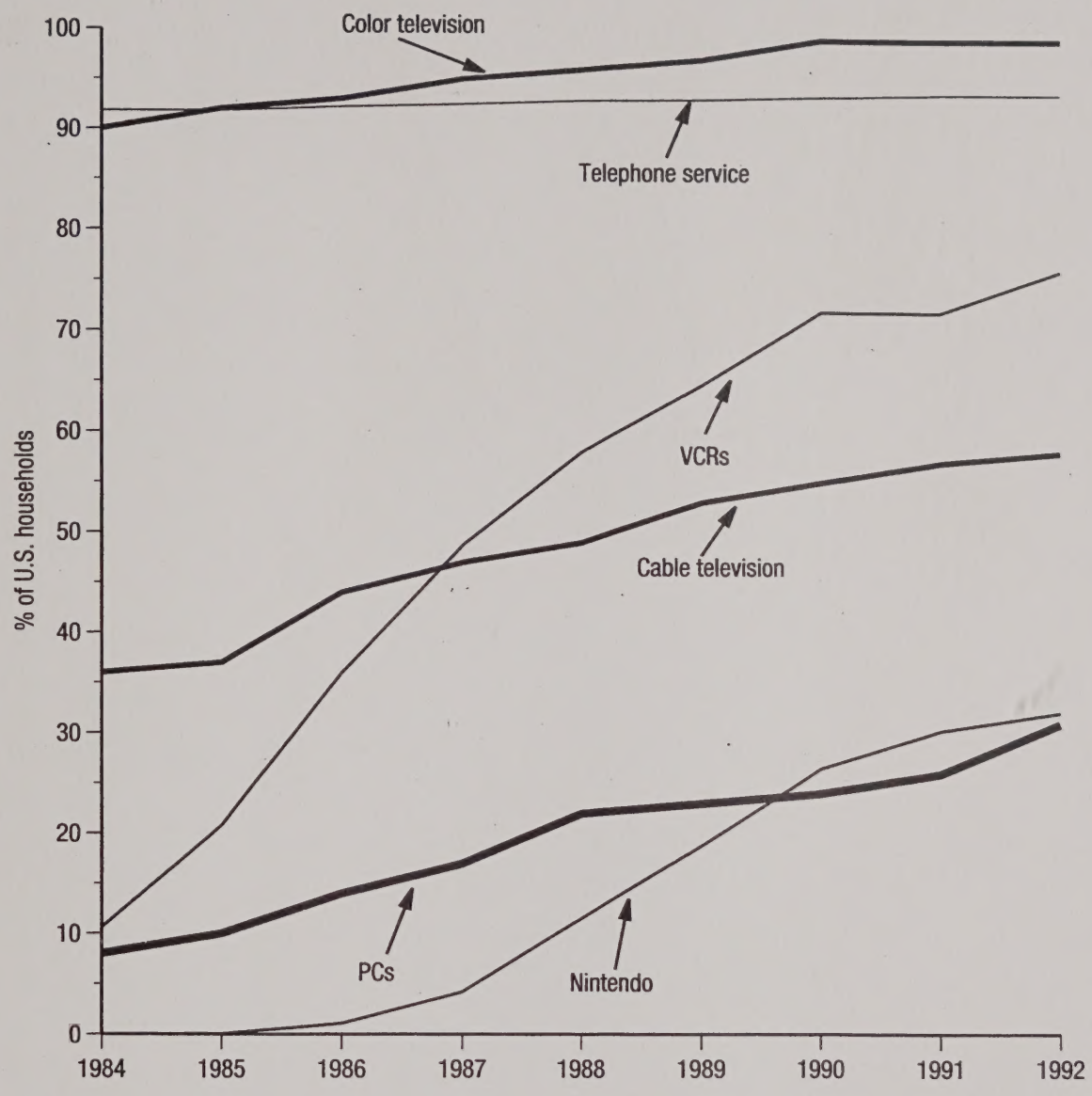
United States IT Market by Major Category, 1969–1992



Source: International Data Corporation, 1993

Spending on hardware has been a steadily declining component of the overall U.S. IT market since 1969. Software and services now account for a majority of the total market in the United States.

Penetration of Major Electronic Media in the United States, 1984–1992



Source: International Data Corporation and Statistical Abstract of the U.S., LINK Resources Corporation, 1993

PCs and Nintendo — two precursors to "interactive" media — still lag far behind traditional media penetration in the United States. Even if penetration rates grow as quickly as the VCR, neither will reach telephone/television-like ubiquity soon.

Gray Sheet Charts Available for Reproduction

IDC is selling the charts from this issue for use in presentations and reproduction. All 26 charts will be available as camera-ready hardcopy, as well as in Macintosh EPS format on a single disk, for $179. Please contact Linda Rich at (508) 935-4389 for more information.

Thirty Years of Change, Part II:

A Review of Analysis and Comment from *The Gray Sheet's* Archives

A review of *The Gray Sheet's* 30 years of predicting, leading, and following the twists and turns of the EDP-computer-IT industry is a fascinating tour. In 30 years the industry has grown one hundredfold from under $4 billion in annual user spending to a projected $400 billion this year. The number of companies making computers, software, and computer components has grown from a dozen to many thousands.

The computer industry has become, in terms of employment and productivity, one of the most important sectors of the worldwide economy. It has injected more sheer wealth and vitality into the worldwide economy than any comparable industrial sector. And it has outgrown, and continues to outgrow, nearly every other sector of the economy — often by a startling margin.

Perhaps even more startling is the degree to which the computer revolution is a people's revolution. In 1964 computers were only beginning to touch people's lives . . . and then in only very oblique ways. They were used by a select group of highly trained professionals numbering only approximately 140,000. By 1971 the number was up to one million people — most of them still using centralized IBM systems.

In 1978, when the first PCs were developed, about seven million people around the world were directly involved with computers. By 1985, 50 million people around the world were using computers, and now approximately 450 million people around the world are involved with or use computers in some capacity.

In an effort to summarize some of the changes *The Gray Sheet* has witnessed, we have undertaken a brief review of the 700 issues of this newsletter. Throughout this exercise we have noted the consistency with which certain themes appear:

- Architectural life cycles and technological replacement. In 1964 IBM was poised to release a major new hardware line, the S/360, that was largely incompatible with its previous products. Balancing existing, profitable lines of business with threatening new technology remains one of the most daunting management challenges. Failure to do so has led to the decline of dozens of seemingly invincible hardware and software companies.

The Next 30 Years

"We will not anticipate the past; so mind, young people — our retrospection will be all to the future"

— Richard Brinsley Sheridan, 1751–1816

The not-unpleasant distraction of reviewing 30 years of the information-technology industry is a good way of shedding light on the future. The next 30 years will be filled with a similar level of discontinuity and drama. Many questions and challenges from the past will be repeated. In addressing them every bit of historical perspective will help.

What are the technologies that will rock the industry during the next 30 years? Many of the most important (and certainly the fastest growing) will revolve around consumer computing or mass computing. The depersonalization of the PC and the growth of wireless information services are two examples.

Network intelligence will slowly chip away at PC users' attachment to their PCs. Instead, the value for PC users will lie in their data on the network. Local processing and storage will migrate to the network (where they're better handled anyway). The value of any individual computer (PC, minicomputer, super computer, or mainframe) will become a function of its network access.

PCs will become true commodity items — given away by information service suppliers. These units will become as disposable as pocket calculators (an evolution that took almost 50 years). Razor-thin hardware margin will stand in stark contrast to service- and transaction-providers' more lucrative commission structure. Tremendous market share and power will accrue to vendors who embrace this ubiquity of computing as a liberating concept, rather than propagate illiteracy (read also: inability to communicate) as a control mechanism.

In addition, the growth of information services will stretch the concept of applications and data. Data and applications will become indistinguishable from each other. Software without data will become obsolete. Likewise the corollary.

What does this mean for the industry? For one, a new class of services companies will rise and will serve a similar function to today's publishing companies. These former publishers will become the outermost end of the IT value chain. They will add value by customizing the network experience to individual tastes.

For another, companies will need to become even more adaptable. Over the next 30 years getting in and getting out of a platform or product will be critically important. Commitment to a specific ideology can quickly foster a stifling groupthink disorder.

One cycle is clear: prospering in successive technology waves is very difficult. It wasn't until the AS/400 that IBM got the minicomputer right. Digital has never been a leader in PCs.

It's the same with software, too. Consider Cullinet and Lotus. Microsoft is only now facing its most significant challenge. It is trying to replicate the success of DOS (Windows has really just been an extension). History has shown that the odds are stacked against Microsoft. It is a challenge that every other IT supplier will face sometime in the coming years.

IT suppliers will need to balance two often incongruous qualities for continued growth. An ability to impart a vision for how customers can protect their investments remains tantamount. Doing so without clinging to doomed models, architectures, or world views is the hard part. But there is really no other course for established or growing IT companies alike.